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THE BOOK

OF

CHOICE FERNS

FOR

THE GARDEN. CONSERVATORY, AND STOVE.

DESCRIBING AND GIVING EXPLICIT CULTURAL DIRECTIONS FOR THE BEST AND MOST STRIKING FERNS AND SELAGINELLAS IN CULTIVATION.

ILLUSTRATED WITH

COLOURED PLATES AND NUMEROUS WOOD ENGRAVINGS,

SPECIALLY PREPARED FOR THIS WORK.

BY

GEORGE SCHNEIDER,

Membre Correspondant de la Société Nationale d'Horticulture de France (Paris); Membre Correspondant de la Société d'Horticulture de St. Germain-en-Laye (France); Membre Correspondant de la Société d'Horticulture du Nord de la France; Membre Correspondant de la Société d'Horticulture de Valenciennes; Membre de la Société d'Horticulture de Seine-et-Oise (Versailles); Membre de la Société Royale d'Agriculture et de Botanique de Gand (Belgique).

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VOLUME II.

FROM BLECHNUM TO NOTHOCHLÆNA.

LONDON: L. UPCOTT GILL, 170, STRAND, W.C.

1893.

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PREFACE TO VOL. II.

THE general approbation bestowed upon the First Volume of "The Book of Choice Ferns," by numerous persons holding various positions in the Horticultural World, but all qualified to give an opinion on the value of such a publication, besides being very gratifying to the Author, also proves that he has succeeded in producing a work combining the scientific classification of, and the results of scientific researches by, previous authors of unquestionable merit, with his own descriptions based on popular lines and made so simple as to convey a clear meaning to even the least technically educated of its readers. Such was the Author's aim; and while he has spared no pains in making the work a trustworthy and really genuine addition to the Garden Library, it has received at the hands of the Publisher such special attention as to render it an ornamental book as well as a useful work of reference.

The frequent recurrence, in Vol. I., of popular expressions explanatory of technical terms may have appeared unnecessary to the scientific reader, but to the uninitiated this plan has gradually conveyed a knowledge of these terms, which, as will be noticed, are now employed with much more freedom; and it is hoped by the Author that when the work is completed, the majority of readers will have become thoroughly conversant with the technical expressions contained in it.

Strict accuracy in matters relating to the culture and the history, as well as to the nomenclature of Ferns, having been the main object of the

Author, it is deemed necessary to rectify here an error which has crept in. This relates to the discovery of "Apospory," a newly-observed form of reproduction, which, at page 141 of Vol. I., is attributed to Mr. Mapplebeck, and at page 547 to Mr. G. B. Wollaston, but the true nature of which was first detected and demonstrated by Mr. Chas. T. Druery, who reported upon it in a paper read before the Linnean Society on June 19th, 1884. In the autumn of that year he exhibited plants and fresh material which led to further investigation by Prof. F. O. Bower, who fully confirmed Mr. Druery's observations, first in a short paper which embodied Mr. G. B. Wollaston's fresh discovery of Apical Apospory, and subsequently in an exhaustive monograph published by the Linnean Society. Mr. Mapplebeck's discovery related to dorsal bulbils on *Asplenium Filix-fœmina*, a quite distinct phenomenon.

The generic limitation as laid down by Hooker and Baker in their "Synopsis Filicum," which work was a constant guide in the compilation of Vol. I. of "The Book of Choice Ferns," has been strictly adhered to in this volume, which, it is hoped, will give equal satisfaction to all interested in the subject.

GEORGE SCHNEIDER.

17, Field Road,
West Brompton, S.W.
1893.

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ERRATA.

Page 298, line 16, for *Holochlæna* read *Holcochlæna.*
Page 511, line 11, for *pseudo-mas* read *propinqua.*

THE BOOK OF CHOICE FERNS.

VOL. II.

BALANTIUM—Bal-an′-tĭ-um. *See* **Dicksonia.**
BLECHNIDIUM—Blēch-nid′-ĭ-um. *See* **Blechnum.**
BLECHNOPSIS—Blēch-nop′-sis. *See* **Blechnum.**

CHAPTER I.

BLECHNUM, *Linnæus.*

(Blēch′-num.)

IN Hooker and Baker's "Synopsis Filicum" *Blechnum* is given as Genus 34. It forms by far the most extensive part of the *Blechneæ*, a tribe composed exclusively of Ferns widely diffused through Tropical and South Temperate regions, as the plant popularly but erroneously known as *Blechnum Spicant*, and a native of Europe, is in reality a Lomaria and not a Blechnum. The genus is a comparatively small one, and derives its appellation from *Blechnon*, a Greek name for a Fern.

Besides *Eublechnum*, or the true *Blechnum* of Linnæus, the genus comprises *Blechnopsis* of Presl and *Blechnidium* of Moore, which are separated by these authorities only on very superficial characters. The genus also includes *Salpichlæna* of J. Smith, which consists of only one species, differing from all

others through its fronds being bipinnate (twice divided to the midrib) and through its stem being of a twining nature.

The distinctive characters of *Blechnum* lie in the disposition of the sori (clusters of spore cases), which are linear (long and narrow), continuous or nearly so, and occupy a position parallel with, and usually contiguous to, the midrib. Their involucre (covering) is membranous and distinct from the edge of the frond. With the exception of *B.* (*Salpichlæna*) *volubile*, the fronds of which are bipinnate, all the Ferns contained in the genus have their fronds either simple (undivided), as in *B. Lanceola;* pinnatifid (the divisions of the frond not extending quite to the rachis, or stalk of its leafy portion), as is the case in the popular *A. brasiliense;* or simply pinnate (only once divided to the rachis), like those of the common *B. occidentale* and *B. orientale.* The veins, usually free, are forked; those of the fertile fronds, which are slightly contracted, being combined near their base at the point of forking by a transverse vein, and forming the sporangiferous receptacle near the midrib.

Culture.

This genus is composed of mostly handsome-growing plants, of strong habit, very useful for decorative purposes, although there are also included in it several dwarf kinds that are particularly adapted for growing in Fern-cases or in shallow crevices in the rockery. Like the Lomarias, to which they are closely allied, but from which they differ in not producing separate fertile fronds, the Blechnums are mostly hardy, of robust constitution, and of rapid growth. They also have a particular dislike to water over the fronds, which causes them to turn first brown and then black in a very short time, unless the plants are in a very light, warm, and well-ventilated place, which, to a certain extent, counterbalances the effects of the superfluous moisture by not allowing it to remain on the foliage long enough to injure it. Blechnums are not at all fastidious as to their food, and will thrive in almost any compost; but their fronds become stouter and have more consistency when grown in a mixture of two parts peat, one part loam, and one part sand, with good drainage, taking care that the roots never suffer from want of water. Propagation is usually effected by means of the spores, which are produced in abundance, and which germinate very freely when sown in heat.

Principal Species and Varieties.

B. (Eublechnum) arcuatum—Eu-blēch′-num ; ar-cŭ-a′-tum (curved, or bent like a bow), *C. Gay.*

This is a distinct, greenhouse species, native of Chili and Chiloe. Its fronds, simply pinnate (only once divided to the midrib), are produced from a stout, somewhat upright stem, densely clothed at the crown with spear-shaped, sharp-pointed, dark brown scales ; they are usually 1ft. to 1½ft. long, 1½in. to 2in. broad, and borne on strong, upright stipites (stalks) 6in. to 12in. long and scaly at the base ; their outline is linear-lanceolate (narrow-spear-shaped), and they are furnished on each side of the midrib with numerous sickle-shaped leaflets of a rigid and very leathery texture, gradually narrowed upwards, auricled (eared) on the upper side, quite distinct at the base, but sometimes imbricated (overlapping), gradually diminishing downwards to mere auricles. The sori (spore masses) are disposed in a continuous line close to the midrib.—*Hooker, Species Filicum*, iii., p. 59.

B. (Eublechnum) asplenioides — Eu-blēch′-num ; as-ple′-nĭ-ŏ-i′-des (Asplenium-like), *Swartz.*

A stove species, of small dimensions, native of Tropical America, from Panama and New Granada to Brazil and Peru. The fronds, stalkless or nearly so, are produced from án elongated stem clothed at the crown with small, narrow scales of a light brown colour ; they are narrow-spear-shaped in outline, narrowed at both ends, about 6in. long and ½in. broad, and are furnished with numerous leaflets of a somewhat leathery texture, sometimes blunt, at other times sharp-pointed, but all connected at the base with one another, the lower ones very gradually dwindling in size. The sori (spore masses), which are disposed in a short line close to the midrib, are often situated on one side only.—*Hooker, Species Filicum*, iii., p. 45.

B. (Eublechnum) australe — Eu-blēch′-num ; aus-tra′-lĕ (Southern), *Linnæus.*

This greenhouse species, native of South Africa, northward to Bourbon and Madagascar, produces its spear-shaped fronds, 9in. to 18in. long, 2in. to 3in. broad, from a stout, creeping stem of a scaly nature ; the fronds are borne

on erect stalks 4in. to 6in. long and are furnished with numerous pinnæ (leaflets). The barren pinnæ are 1½in. long and ¼in. broad, narrowed to a sharp point, cordate or auricled (heart-shaped or eared) at the base, especially on the upper side, the lower ones dwindling into mere auricles; the fertile pinnæ are narrower: all are of a rigid and coriaceous (leathery) texture. The sori (spore masses), which sometimes reach the edge, are disposed in a continuous or slightly-interrupted line not quite close to the midrib. — *Hooker*, *Species Filicum*, iii., p. 57. *Nicholson*, *Dictionary of Gardening*, i., p. 193.

B. boreale—bor-ĕ-a′-lĕ (Northern). Synonymous with *Lomaria Spicant.*

Fig. 1. Blechnum brasiliense
(much reduced).

B. (Eublechnum) brasiliense—Eu-blēch′-num; bras-il-ĭ-en′-sĕ (native of Brazil), *Desvaux.*

This very handsome and popular, greenhouse or stove species, native of Brazil and Peru, is undoubtedly the strongest-growing plant of the genus, and also the most useful as a decorative Fern (Fig. 1). Its stem, which attains an average height of 3ft., is of rather slender dimensions in proportion to its height, and is densely clothed at the crown with dark brown scales.

The fronds, which are produced in great abundance, are oblong-spear-shaped, 2ft. to 3ft. long, 1ft. or more broad, narrowing downwards very gradually: they are pinnatifid, their leaflets, of a coriaceous (leathery) texture, not being cut quite down to the midrib, with which they remain connected along the whole length of the frond; when mature they are somewhat inclined to be pendulous, getting with age into a nearly horizontal position. The numerous pinnæ (leaflets) are 4in. to 6in. long, ½in. broad, gradually narrowed towards the point, very finely toothed, the lower ones only being short and blunt; they are of a light green colour, with both surfaces naked, and the sori (spore masses) are disposed in a continuous line close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 43, t. 157. *Nicholson*, *Dictionary of Gardening*, i., p. 193. *Lowe*, *Ferns British and Exotic*, iv., t. 38.

B. b. corcovadense—cor-co′-va-den′-sĕ (from Corcova), *Raddi.*

This variety, extensively grown for decoration, differs from the typical species in its fronds being of a beautiful crimson colour when young, gradually turning to a metallic hue before becoming permanently green; they are also of a more erect habit. The plant forms an upright stem of the same dimensions as that of *A. brasiliense.*

B. b. c. crispum—cris′-pum (curled).

A very pretty variety is met with in gardens under this name, for which we can find no responsible authority. It is not quite so strong-growing as the type, its fronds being shorter and furnished with wavy leaflets of a harsh texture and with crispy edges.—*Nicholson*, *Dictionary of Gardening*, i., p. 194.

B. (Eublechnum) cartilagineum—Eu-blēch′-num; car-til-a-gin′-ĕ-um (cartilaginous, of a gristly nature), *Swartz.*

A very handsome, greenhouse species, native of the temperate parts of Australia. Its stem, which generally grows in an oblique position, is densely clothed at the crown with scales of a blackish colour. The fronds, 2ft. or more long and 6in. to 9in. broad, are borne on strong, upright stalks 4in. to 6in. long, scaly and muricated (covered with sharp points) in the lower part; they are simply pinnate (only once divided to the midrib) and broadly

spear-shaped. The leaflets are of a leathery texture, gradually narrowed towards the point; they have their margin finely toothed, and are enlarged and connected at the base, the lower ones being very little smaller than the others. The sori (spore masses) are disposed in a broad line close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 43. *Nicholson*, *Dictionary of Gardening*, i., p. 194. *Lowe*, *Ferns British and Exotic*, iv., t. 42.

B. (Eublechnum) Fendleri—Eu-blēch′-num; Fend′-ler-i (Fendler's), *Hooker.*

This stove species, native of Venezuela and Brazil, has much the appearance of the commoner *B. longifolium*, of which it may possibly be but a form of more slender habit, with the sori (spore masses) disposed in continuous lines close to the midrib and covered with a pale-coloured, broad involucre of parchment-like texture and slightly hairy.—*Hooker*, *Species Filicum*, iii., p. 48, t. 158.

B. (Eublechnum) Finlaysonianum — Eu-blēch′-num; Fin-lay-son-ĭ-a′-num (Finlayson's), *Wallich.*

A gigantic-growing, stove species, native of the Malayan Peninsula and Borneo. Its ample fronds, 3ft. to 4ft. long and borne on strong, upright, dark brown, polished stipites (stalks) 1ft. long, are produced from a short, thick stem, and are composed of a large terminal leaflet and numerous lateral ones of a leathery texture and with both surfaces smooth. The largest of these leaflets, 9in. to 12in. long and 1in. broad, are gradually narrowed to a point, and below to a narrow base, the lowest being reduced to mere auricles. The sori (spore masses) are disposed in a continuous line close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 53. *Beddome*, *Ferns of British India*, t. 249.

B. fraxinifolium—frax-in-if-ol′-ĭ-um (Ash-leaved). A garden synonym of *B. longifolium fraxineum.*

B. (Eublechnum) glandulosum — Eu-blēch′-num; glan-dul-o′-sum (having glands), *Link.*

This is a very interesting, stove species, native of Brazil and Mexico, which produces from a creeping rhizome (prostrate stem) its spear-shaped

fronds, of a uniform pale green colour, 1ft. to 1½ft. long, and furnished with long and narrow, somewhat sickle-shaped pinnæ (leaflets) of parchment-like texture and minutely hairy. The sori (spore masses) form a continuous line on each side of the midrib, and extend nearly to the point of the leaflets.—*Lowe, Ferns British and Exotic*, iv., t. 41.

B. gracile—grac′-il-ĕ (slender). A variety of *B. longifolium.*

B. (Eublechnum) hastatum — Eu-blēch′-num ; has-ta′-tum (halbert-shaped), *Kaulfuss.*

A very distinct and pretty, greenhouse species, native of the temperate parts of South America, producing from a short, stout, scaly stem its spear-shaped fronds, 1ft. to 1½ft. long and 2in. to 4in. broad ; these are borne on erect and nearly smooth stalks 4in. to 6in. long, and are furnished on each side with from twenty to forty pinnæ (leaflets) of a leathery texture. The barren leaflets, 1in. to 1½in. long and ½in. broad, are somewhat sickle-shaped and gradually narrowed to a point ; they are slightly auricled on their lower side, whereas their upper side is heart-shaped and provided with distinct, hastate (halbert-shaped) auricles. The fertile leaflets, of similar shape, are narrower, and the sori (spore masses) are disposed half-way between the midrib and the edge in a continuous or more or less interrupted line. —*Hooker, Species Filicum*, iii., p. 57. *Nicholson, Dictionary of Gardening*, i., p. 194. *Lowe, Ferns British and Exotic*, iv., t. 33B.

B. (Eublechnum) lævigatum—Eu-blēch′-num ; læ-vig-a′-tum (smooth), *Cavanilles.*

This most interesting, greenhouse species, native of Port Jackson, New South Wales, is, of all the known Blechnums, that in which the dimorphous (two-formed) character of the fronds is most noticeable. In nearly all others the difference between the barren and the fertile fronds is hardly perceptible, whereas in this species they are totally different. Both kinds are borne on pale-coloured stipites (stalks) 6in. to 9in. long, and are produced from a stout, ascending stem clothed at the crown with large, spear-shaped scales of a pale brown colour : the barren ones, 9in. to 15in. long and 6in. to 9in. broad, are composed of a large terminal leaflet and from fifteen to twenty pairs of lateral ones of a coriaceous (leathery) texture, elliptical in shape,

suddenly narrowed to an acuminate point, with their margin finely toothed, quite distinct and heart-shaped at the base; while young they are of a beautiful rosy colour. In the fertile fronds, which are much smaller, the leaflets stand erect and are much contracted, being thus much narrower and also more distant, their breadth varying from ⅛in. to ¼in. The spore masses form with the midrib an uninterrupted and contiguous line about two lines broad, covered with large brown involucres of a membranous nature. —*Hooker*, *Species Filicum*, iii., p. 56. *Lowe*, *New and Rare Ferns*, t. 58.

B. (Eublechnum) Lanceola—Eu-blēch′-num; Lan′-cĕ-ol-a (lance-leaved), *Swartz.*

An interesting, evergreen, greenhouse species, of dwarf habit, native of Tropical America, where it is found from Panama southward to Brazil and Peru. Its little, entire (undivided) fronds, 4in. to 6in. long and ½in. broad, spear-shaped, and of a somewhat leathery texture, are borne on slender, erect stalks 2in. to 4in. long, and produced from a slender, creeping rhizome of stoloniferous nature; that is to say, at the point of junction between the crown and the roots the plant is provided with loose, trailing branches or shoots which take root at intervals, whence fresh buds are developed. The sori (spore masses) are disposed in a continuous line on each side of and close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 47. *Nicholson*, *Dictionary of Gardening*, i., p. 195. *Lowe*, *Ferns British and Exotic*, iv., t. 33A.

This pretty little species is particularly adapted for planting in Fern-cases, where it thrives admirably, and where the contrast between the bright dark green of the upper surface of its fronds and the continuous central band of deep brown formed by the sori is very conspicuous and attractive.

B. L. trifoliatum—trif-ol-ĭ-a′-tum (three-leaved), *Kaulfuss.*

This is very similar to the typical plant, but its fronds are furnished with one or two pairs of small, oblong, blunt lateral leaflets at their base. As in the little-known *B. plantagineum* of Presl, an open space is frequently observed between the line of fructification and the midrib.—*Nicholson*, *Dictionary of Gardening*, i., p. 195.

B. (Eublechnum) longifolium—Eu-blēch′-num ; long-if-ol′-ĭ-um (long-leaved), *Hooker and Bonpland.*

A variable, stove species, native of Tropical America and the West Indies. Its fronds are simply pinnate (only once divided to the midrib), usually from 9in. to 12in. long including their stalks, and are produced from a slender, creeping rhizome ; they consist of a terminal leaflet and three to six pairs of lateral ones (Fig. 2), of a leathery texture, 3in. to 5in. long and ½in. broad, gradually narrowed towards the point and somewhat heart-shaped at the base, the lower ones about 1in. apart. The sori (spore masses) are disposed in broad lines close to the midrib.—*Hooker, Species Filicum*, iii., p. 49, t. 94. *Lowe, Ferns British and Exotic*, iv., t. 37.

Fig. 2. Blechnum longifolium (¼ nat. size).

B. l. fraxineum—frax-in′-ĕ-um (Ash-leaved), *Willdenow.*

A variety generally found in gardens under the name of *B. fraxinifolium ;* it is more robust and closer-growing than the type, with six to eight pairs of leaflets, sometimes 1in. broad.—*Nicholson, Dictionary of Gardening*, i., p. 195.

B. l. gracile—grac′-il-ĕ (slender), *Kaulfuss.*

A distinct and pretty variety, differing from the species through the slender habit of its fronds, which are of a beautiful red colour when young. It is a good companion to *B. Lanceola* when planted in the Fern-case, and thrives under the same treatment.—*Nicholson, Dictionary of Gardening*, i., p. 195.

B. (Blechnidium) melanopus—Blēch-nid′-ĭ-um ; mel-an′-op-us (having a dark foot or stalk), *Hooker.*

A greenhouse species, of small dimensions, native of the Khasia Hills, Bengal, and distinct through the dark chestnut-brown colour of the stalks on

which its spear-shaped fronds, 8in. to 9in. long and 2in. to 3in. broad, are borne. These fronds are furnished with numerous narrow-sickle-shaped pinnæ (leaflets) of a leathery texture, about 1½in. long and ¼in. broad, gradually narrowed towards the point and enlarged at the base, the lowest ones growing gradually shorter and blunter. The sori (spore masses) are disposed in a continuous line near the midrib.—*Hooker*, *Species Filicum*, iii., p. 64, t. 161. *Beddome*, *Ferns of British India*, t. 50.

B. (Eublechnum) nitidum — Eu-blēch′-num ; nit′-id-um (shining), *Presl.*

This stove species, of medium size, somewhat resembles *B. brasiliense* in general appearance, but is much smaller. Its fronds are simply pinnate (only once divided to the midrib), and borne on scaly stalks 3in. to 4in. long ; they are about 10in. long and 4in. to 6in. broad, and are furnished with numerous somewhat sickle-shaped leaflets of a coriaceous (leathery) texture, 2in. to 3in. long, ¼in. broad, gradually narrowed towards the point, but enlarged and connected at the base (Fig. 3), and with their edges finely toothed. The sori (spore masses) are disposed in a continuous line close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 44, t. 55. *Nicholson*, *Dictionary of Gardening*, i., p. 195. *Beddome*, *Ferns of British India*, t. 49.

Fig. 3. Blechnum nitidum
(¼ nat. size).

B. n. contractum—con-trac′-tum (contracted), *Hooker.*

This variety differs from the typical plant through its leaflets being conspicuously contracted and having their edge much undulated.—*Hooker*, *Synopsis Filicum*, p. 184.

B. (Eublechnum) occidentale—Eu-blēch′-num ; oc-cid-en-ta′-lĕ (from the West), *Linnæus.*

One of the best-known and most-appreciated among Ferns of dwarf habit is this West Indian, stove species, probably on account of its easy cultivation, as also of the lasting qualities of its elegant fronds, which remain fresh a very long time in water, when used for mixing with cut flowers. Besides, it has

Fig. 4. Blechnum occidentale
(⅛ nat. size).

for years been used in many private establishments for growing amongst orchids, to which it forms a very effective background or undergrowth, the more so that it is a plant never infested by insects of any sort, and that it grows as well in coarse sand, gravel, or moss as in the best compost. The fronds, 9in. to 15in. long and 4in. to 8in. broad, are borne on upright but flexible stalks 6in. to 12in. long and scaly below ; they are furnished on each

side of their midrib with twelve to twenty-four linear leaflets of a leathery texture, 3in. to 6in. long and ¾in. broad, gradually narrowed to a point, heart-shaped or even auricled at the base, the lower ones often 1in. apart, and the lowest pair usually deflexed (Fig. 4) and very little shorter than the others. The sori (spore masses) form a broad, continuous line close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 50. *Lowe*, *Ferns British and Exotic*, iv., t. 39. *Nicholson*, *Dictionary of Gardening*, i., p. 195.

B. o. multifidum—mul-tif′-id-um (much-cut).

A very pretty variety, said to have been introduced from Dominica, but for the name of which we can find no authority. Its very elegant fronds attain about 1ft. in length ; they are pinnate (once divided to the midrib), their leaflets being copiously crested and tasselled at their extremity, giving the whole plant a very elegant and pleasing appearance. In general habit it is similar to the species, but the weight of the tassels renders the fronds more pendulous and more elegant.—*Nicholson*, *Dictionary of Gardening*, i., p. 195.

B. (Blechnopsis) orientale — Blēch-nop′-sis ; or-ĭ-en-ta′-lĕ (Eastern), *Linnæus.*

This very handsome, robust, greenhouse species, whose habitat extends from Australia and the Polynesian Islands northward to South China and the Himalayas, is no doubt one of the most interesting of the whole genus. Its massive fronds, 1ft. to 3ft. long and frequently 1ft. broad, are produced from a stout, upright stem clothed at the crown with dark brown scales, and borne on strong, erect stalks 4in. to 8in. long and scaly below ; they are egg-shaped, and furnished on each side of their midrib with numerous nearly contiguous pinnæ (leaflets) of a leathery texture, 4in. to 8in. long and ¾in. broad, narrowed to a long point, a few of the lowest being reduced to mere auricles or lobes. The leaflets, when young, are of a beautiful metallic colour, changing with age to a uniform light green, and the fronds being of a particularly drooping habit, this species is very useful where Ferns are required for hanging baskets of large dimensions. The sori (spore masses) are disposed in a long, continuous line close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 52. *Lowe*, *Ferns British and Exotic*, iv., t. 40. *Beddome*, *Ferns of Southern India*, t. 29.

B. (Eublechnum) plantagineum—Eu-blēch′-num ; plan-ta-gin′-ĕ-um (Plantain-like), *Presl.*

A stove species, from Panama, with entire fronds very similar to those of *A. Lanceola*, from which it differs by having a distinct space between the line of fructification and the midrib.—*Hooker*, *Synopsis Filicum*, p. 183.

B. polypodioides — pol-yp-od-ĭ-ŏ-i′-des (Polypodium-like). Synonymous with *B. unilaterale.*

B. (Eublechnum) rugosum—Eu-blēch′-num ; ru-go′-sum (wrinkled), *Moore.*

A very distinct, greenhouse Fern, of medium dimensions, remarkable for the opaque pale green colour and the harsh, rugose surface of its narrow-spear-shaped fronds, borne on densely-glandular stalks 3in. to 4in. long and particularly hairy above, as are also the stalks. The leaflets are oblong, blunt or sometimes abruptly pointed and sickle-shaped. The sori (spore masses) are disposed along the midrib, and extend from the base nearly to the extremity of the leaflets.—*Nicholson*, *Dictionary of Gardening*, iv., p. 500.

B. (Eublechnum) serrulatum—Eu-blēch′-num ; ser-rul-a′-tum (saw-edged), *Richard.*

This very handsome, stove or greenhouse species is the only one in which the leaflets are plainly and distinctly articulated to the stalks ; it is a native of the West Indies, Guiana, Brazil, Australia, New Caledonia, Borneo, Malacca, and North America, where it is called the "Florida Blechnum," and where, according to Eaton, it is found wild in wet places, chiefly along streams and about ponds, especially in the southern part of Florida. The fronds, produced from a stout, ascending rhizome (prostrate stem) and borne on strong, erect, smooth stalks 6in. to 12in. long, are 1ft. to 2ft. long, 6in. to 9in. broad, and furnished on each side of their rachis (stalk of the leafy portion) with from twelve to twenty-four distinctly-articulated pinnæ (leaflets) of a leathery texture. The pinnæ are elliptical or narrow-oblong, 4in. to 5in. long and ½in. broad, gradually narrowed towards the point and downwards to a rounded or obtusely wedge-shaped, often unequal, base ; their margin is very finely toothed. The fertile leaflets, usually confined to the upper part of the frond, are narrower and often longer than the barren ones. The sori (spore masses)

are disposed in a continuous line close to the midrib. *B. striatum* is another name for this species.—*Hooker*, *Species Filicum*, iii., p. 54. *Nicholson*, *Dictionary of Gardening*, i., p. 195. *Lowe*, *Ferns British and Exotic*, iv., t. 43. *Eaton*, *Ferns of North America*, i., t. 19.

B. Spicant—Spi′-cant (spiked). This is the commonest but an erroneous appellation for *Lomaria Spicant.*

B. striatum—strĭ-a′-tum (striped). Synonymous with *B. serrulatum.*

B. (Eublechnum) triangulare—Eu-blēch′-num ; trĭ-ang-ul-a′-rĕ (three-angled), *Link.*

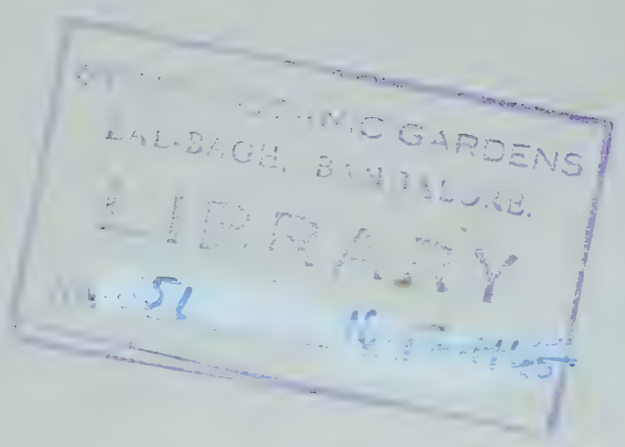
This evergreen, stove species, native of Mexico, somewhat resembles a form of *B. occidentale*, from which, however, it is totally distinct through its leaflets, mostly alternate (not opposite, as those of *B. occidentale*), being sessile (stalkless), and forming a wing extending the whole length of the rachis (stalk of the leafy portion). The fronds, of a deep green colour, are from 1ft. to 1½ft. long, borne on scaly stalks, and produced from a creeping rhizome (prostrate stem). The sori (spore masses) are disposed in a continuous line on each side of and close to the midrib of the leaflets, and extend nearly to their extremity.—*Lowe*, *Ferns British and Exotic*, iv., t. 35.

B. (Eublechnum) unilaterale—Eu-blēch′-num ; u-nil-at-er-a′-lĕ (one-sided), *Willdenow.*

This very elegant, stove or greenhouse species, of small dimensions, native of Tropical America, is usually met with in gardens under the name of *B. polypodioides.* Its fronds, which while in a young state are of a beautiful and conspicuous pink colour, are borne on slender stalks 1in. to 4in. long, scaly below, and produced from an elongated rhizome (prostrate stem) densely clothed at the crown with narrow, pale brown scales ; they are lanceolate (spear-shaped), 6in. to 12in. long, about 2in. broad, and furnished with numerous leaflets of a thin, papery texture, usually toothed at the point, but with the edges smooth or nearly so, the lower ones being dilated to a broad base, shorter, and blunt. The sori (spore masses) are disposed in a line close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 45. *Nicholson*, *Dictionary of Gardening*, i., p. 195. *Lowe*, *Ferns British and Exotic*, iv., t. 34.

B. (Salpichlæna) volubile — Sal-pich-læ′-na ; vol-u′-bil-ĕ (twisting), *Kaulfuss.*

A singular and distinct, stove species, native of the West Indies, Brazil, and Peru, with stipites (stalks of the fronds) of a climbing nature, furnished with pinnæ (leaflets) disposed in opposite pairs. The leaflets are divided into pinnules (leafits) of a leathery texture, usually four to six on each side of the leaflets, and narrow-spear-shaped ; they are from 6in. to 12in. long, about 2in. broad, and have a peculiarly gristly border. The sori (spore masses), disposed in a continuous line along the midrib, are at first covered by a broad involucre of parchment-like texture, which afterwards breaks up into short pieces.—*Hooker, Species Filicum*, iii., p 63.



CHAPTER II.

BOTRYCHIUM, *Swartz.*

(Bot-rych′-ĭ-um.)

Moonwort.

THIS small genus is composed of very interesting and pretty, though not decorative, Ferns of dwarf habit, and it forms Genus 75 in Hooker and Baker's "Synopsis Filicum." All the known species are native of temperate regions, viz.: Europe, from Iceland and Norway to Spain; Australia, New Zealand, and Tasmania, the Himalayas and the Neilgherries, Japan, the United States, and British North America; but only one species, *B. Lunaria*, is indigenous in Great Britain.

The name is derived from the Greek *botrys*, signifying a bunch or cluster—in reference, no doubt, to the bunch-like disposition of the fructification, by which, as well as by their peculiar mode of growth, the species belonging to this genus are distinguished from all others. The plant is composed of a slender tap-root, from which issue numerous cylindrical, yellowish fibres, disposed in a whorl (circle), but spreading horizontally in the soil: from this arises a single stem of a fleshy nature, and from about the middle of which the barren and fertile fronds are produced, the fertile one appearing to be simply the continuation of the stem, which ends in a cluster of small, round, light brown capsules. These capsules are sessile (stalkless), and arranged in two rows on the face of spikes, which form a compound panicle. A latent bud, containing the embryo of the frond for the following year, is invariably noticed at the base of the stem.

Central Avenue of the Conservatory, Chatsworth.

Culture.

This interesting genus contains some very curious plants, all deciduous; but they are seldom seen in cultivation, probably on account of the difficulties experienced in keeping them through the winter, when they should not on any account be allowed to get dry, or death will speedily and assuredly ensue. They are of little use as pot plants, but their fertile fronds have a very pleasing appearance among other Ferns when grown in the rockery, in which case they should be planted in some naturally damp nook where they are not likely to be disturbed, and where constant moisture may be secured for them while at rest. The difficulty in taking them up consists in getting the crowns with their roots, as they are generally found to be deeply imbedded in the ground. To induce Botrychiums to grow in a Fernery, they should be moved with about a square foot of the turf in which they are growing naturally, and as much of depth of the soil undisturbed. They like to have their roots covered with turf, though they should not be overshadowed by other vegetation. The plants succeed best in a compost of sandy loam and only a small portion of peat, and perfect drainage is essential. Propagation may be effected by division of the crowns. There is no record of seedlings having been raised artificially.

Principal Species and Varieties.

B. australe—aus-tra′-lĕ (Southern). A variety of *B. ternatum.*

B. daucifolium—dau-cif-ol′-ĭ-um (Daucus-leaved), *Wallich.*

A greenhouse species, native of the Himalayas, the Neilgherries, and Japan, with a stem 6in. to 12in. long. The barren frond, from 6in. to 12in. each way, is borne on a petiole (stalk) 1in. to 6in. long; it is either tripinnatifid or tripinnate (three times divided partly or quite to the midrib), the lower leaflets being much the largest. The leaflets, of a thin, papery texture, are divided into oblong-spear-shaped segments ¼in. to ½in. broad and finely toothed. The fertile peduncle (stalk) is about equal to the barren frond when mature, and bears a tripinnate panicle 2in. to 4in. long and of a somewhat loose nature. *B. subcarnosum* is identical with this species.—

Hooker and Greville, Icones Filicum, t. 161. *Nicholson, Dictionary of Gardening*, i., p. 204. *Beddome, Ferns of Southern India*, t. 68.

B. lanuginosum—la-nu-gin-o′-sum (downy). A variety of *B. virginianum.*

B. Lunaria—Lu-na′-rĭ-a (common Moonwort), *Swartz.*

This species, the commonest of the genus, native of various and widely-separated habitats—Northern Europe, the Himalayas, Tasmania, North America, &c.—is perfectly hardy under our climate. It is the only species indigenous in the British Islands, and, though not common, is found in various parts of England, Ireland, and Scotland, for it has been collected in Westmoreland; at Settle, in Yorkshire; on the north side of Bredon Hill, in Worcestershire; near Bury, in Suffolk; on coal-pit banks, near Stourbridge; near Dundonald; near Little Loch Broom, on the west coast of Ross-shire; and in the Isle of Skye. Its usual habitats are mountain meadows and pastures; and Correvon, in his very concise work "Les Fougères rustiques," p. 164, says that it grows in exposed pastures of mountainous regions, in calcareous ground, and that it should be cultivated in a spongy soil that is rich in humus (decayed vegetable matter), mixed with calcareous sand or broken limestone. Eaton, in his beautiful work on North American Ferns, says that it is found in dry, elevated pastures from within the Arctic Circle to Labrador, Newfoundland, Canada, New York, and the Rocky Mountains.

The first English botanist who mentions this Fern is Turner, who, in the third part of his "Herbal," published in 1568, gives a very good woodcut of the plant, and, after its description, adds, "It may be called wel in Englishe Cluster Lunarye or Cluster Moonwort." Gerarde, writing a few years subsequently, mentions many places where it has been found in England, and, after describing its appearance and stating its various appellations, he proceeds to enumerate the extraordinary medicinal and supernatural virtues with which in his time this plant was endowed. Eaton also states that "it was anciently employed in alchemy and magic," but that "its virtues were never rightly manifested unless the plant was collected by moonlight, which," he significantly adds, "was probably not an easy task."

B. Lunaria is a pretty and distinct Fern, whose stem, 1in. to 4in. long, bears a barren frond, sessile (stalkless) or nearly so, 1in. to 3in. long, about 1in. broad, not much broader at the base than at the middle, cut down to

a flattened rachis (stalk of the leafy portion) into five or six pairs of somewhat fan-shaped, short-stalked leaflets of a thick, fleshy texture and pale milky-green colour; each leaflet is scalloped (toothed) on the edge and usually more or less lobed at the base. The fertile peduncle usually equals and sometimes exceeds the sterile frond when fully developed. The panicle of fructification is bipinnate (twice divided to the stalk), of a close nature, spear-head-shaped, and usually 1in. to 2in. long. See Fig. 5.—*Hooker, British Ferns*, t. 48. *Beddome, Ferns of British India*, t. 208. *Eaton, Ferns of North America*, i., t. 5. *Nicholson, Dictionary of Gardening*, i., p. 204.

Fig. 5. Botrychium Lunaria (½ nat. size).

B. lunarioides—lu-na′-rĭ-ŏ-i′-dēs (Lunaria-like). A variety of *B. ternatum.*

B. obliquum—ob-li′-qŭ-um (oblique). A North American variety of *B. ternatum.*

B. rutaceum—ru-ta′-cĕ-um (Rue-like), *Swartz.*

A very pretty species, native of Scandinavia, Denmark, Siberia, the Tyrol, and the Austrian Alps, with a stout stem 1in. to 4in. long, bearing a sessile (stalkless) frond only 1in. to 2in. long, triangle-shaped, and cut down to a flattened stalk into several close, somewhat egg-shaped leaflets on each side, the lower ones of which are deeply cleft. The fertile peduncle (stalk) equals the barren frond when mature, and terminates in a close, bipinnate (twice divided), spear-shaped panicle 1in. to 2in. long.—*Hooker, Synopsis Filicum*, p. 447.

This species is very variable, and several of its distinct forms are usually considered and catalogued as species.

B. r. lanceolatum—lan-cĕ-ol-a′-tum (spear-shaped), *Angstrom.*

This singular form, known in North America under the popular name of "Lanceolate Grape Fern," according to Eaton, grows chiefly in damp, mossy places, along shaded rills, but sometimes on moist hillside pastures; it is also found among mossy stream-banks and in moist pastures from

New Brunswick to Colorado, and in New Hampshire, Massachusetts, and Connecticut: it is of slenderer habit than the typical plant. The pinnæ (leaflets), from six to eight to each barren frond, are narrow-spear-shaped and situated a little distance apart, the lower ones being sharply toothed. The fertile frond, or fruiting segments, disposed in a close panicle of smaller dimensions than in the species, is situated at the extremity of the common stem, which is moderately fleshy and considerably swollen at the base, where it encloses the bud of the fronds for the next year or two.—*Hooker*, *Synopsis Filicum*, p. 447. *Eaton*, *Ferns of North America*, i., t. 5.

B. r. matricariæfolium — ma-tri-ca′-rĭ-æ-fol′-ĭ-um (Matricaria-leaved), *A. Braun.*

This is another form of *B. rutaceum*, although in most works it is classified as a distinct species. Eaton states that it is found in dark, wet woods and in beds of moss along rivulets from New Hampshire and Massachusetts to New York, Canada, &c. Correvon, on the other hand, says that it is generally found growing in company with *B. Lunaria*, though it appears to prefer dry pastures and the heath-beds of the mountains. He adds that it is still found at Chamonix, in the Engadine and Tessin districts of Switzerland, in Tyrol, in the Vosges Mountains, and in Russia. The barren frond, borne on the same stalk as the fertile one, is situated very close to it, and in some cases so close that they appear as opposite fronds: both are much divided and of a fleshy texture; the barren one is of a very dark, shining-green colour, and the fertile one is divided into three branches bearing triangular pinnules divided into numerous fruiting segments.—*Eaton*, *Ferns of North America*, i., t. 17. *Correvon*, *Les Fougères rustiques*, p. 165.

B. simplex—sim′-plex (simple), *Hitchcock.*

A very curious species, of small dimensions, and having somewhat the general appearance of the Ophioglossum, or common Adder's-Tongue. According to Eaton, it is generally found in pastures and on hill-sides from New Brunswick and New England westward to Lake Superior, Wyoming Territory, and California; it is also found in Northern Europe. The stem, 3in. to 4in. long, is of a slender nature, and bears a short-stalked barren

frond 1½in. long, ½in. broad, egg-shaped, and cut down to a flattened stalk into two or three pairs of leaflets, above which the fertile frond—which forms an elongated panicle and consists of a few distant branches, the lowest of which are sometimes branched again—is always situated.—*Hooker*, *Synopsis Filicum*, p. 447. *Eaton*, *Ferns of North America*, i., t. 17.

B. subcarnosum—sub-car-no′-sum (somewhat fleshy). Synonymous with *B. daucifolium.*

B. ternatum—ter-na′-tum (ternate, or arranged by threes about the same part), *Swartz.*

A very variable species, native of Australia, Tasmania, New Zealand, Siberia, and Japan; also found in Europe on the Pyrenees and in Hungary. The bare stem is 1in. to 2in. long. The barren frond, 3in. to 6in. each way and tri- or quadripinnatifid (three or four times divided half-way to the midrib), is borne on a petiole (stalk) 2in. to 4in. long; the lower leaflets are much the largest, and are divided into pinnules (leafits) oblong in shape and slightly toothed. The fertile frond considerably overtops the barren one; it is borne on a peduncle (stalk) 6in. to 9in. long, and consists of a much-divided panicle 1in. to 6in. long.—*Hooker*, *Synopsis Filicum*, p. 448.

Several so-called species, which are only geographical varieties of this one, may be named here:

B. t. australe—aus-tra′-lĕ (Southern), *R. Brown.*

An Australian form, differing from the typical plant only in its larger dimensions.—*Hooker*, *Synopsis Filicum*, p. 448.

B. t. lunarioides—lu-na-rĭ-ŏ-i′-dēs (resembling *B. Lunaria*), *Swartz.*

A North American variety of *B. ternatum*, from which it is only distinguished by its smaller dimensions throughout.—*Hooker*, *Synopsis Filicum*, p. 448.

B. t. obliquum—ob-li′-qŭ-um (oblique), *Muhl.*

Another North American variety, differing from the type in its larger dimensions and in the more finely-divided nature of its growth, of a dark green colour, reaching a total height of 1ft. to 1¼ft. The barren frond, bi- or tripinnately decompound, is furnished with broad, oblique leaflets,

slightly toothed on their margins. The fertile frond is paniculate, and stands about 3in. above the barren one.—*Hooker*, *Synopsis Filicum*, p. 448.

B. virginianum—vir-gin-ĭ-a′-num (Virginian), *Swartz.*

This handsome species, which, according to Eaton, is popularly known in North America as the "Virginian Grape Fern," or as the "Rattlesnake Fern," is found growing wild in rich woods from New Brunswick and Canada to Washington Territory and Oregon, and southward to Colorado, Texas, Alabama, and Florida; it also occurs in Mexico, New Granada, Venezuela, and Brazil. In India it is found on the Neilgherries and the Himalayas up to 6000ft. elevation; and in Europe it is indigenous in Bavaria, Prussia, and Russia, and is even found in the Canton des Grisons, in Switzerland, where, Correvon says, it prefers the moist meadows, especially those near the forests, but where plenty of light is to be had. It is a very distinct and well-characterised species, having a barren frond broader than long, thus forming a triangle situated exactly at the middle of the stalk, which also bears the fertile one. By its shape and by the way in which it is divided, the barren frond much resembles that of the Mountain Bladder Fern (*Cystopteris montana*), for it is from 4in. to 12in. each way, with lower leaflets much the largest; the pinnules (leafits), ovate-oblong in shape and closely set, are divided to a broadly-winged stalk into finely-cut, linear-oblong segments which are themselves very deeply cleft. The fertile frond, which is small, narrow, elongated, and finely divided, is placed from 4in. to 5in. above the barren one, and borne on a peduncle (stalk) equalling or overtopping the barren one when mature; it is formed into a loose, oblong panicle 1in. to 4in. long, and generally not more than bipinnate (twice divided to the midrib).—*Hooker*, *Species Filicum*, p. 448. *Eaton*, *Ferns of North America*, i., t. 33. *Beddome*, *Ferns of Southern India*, t. 67.

B. v. lanuginosum—la-nu-gin-o′-sum (downy), *Wallich.*

A variety with slightly hairy surfaces, the fertile peduncle (stalk) rising from the centre of the barren frond, which the panicle of fructification scarcely overtops.—*Hooker*, *Synopsis Filicum*, p. 448.

CHAPTER III.

BRAINEA, *Hooker.*

(Brai′-nĕ-a.)

THE genus *Brainea*, which was created by Hooker in commemoration of C. J. Braine, Esq., of Hong-Kong, is, up to the present time, represented by a solitary species, *B. insignis*, a sub-arborescent Indian and Chinese Fern resembling *Blechnum* in general appearance, but with naked sori (spore masses devoid of indusium, or covering) and with veins forming costular areolæ (little cells along the costa or midvein). *Brainea* forms Genus 53 in Hooker and Baker's "Synopsis Filicum." Its distinctive characters consist in the sori being continuous along transverse veins near the midrib, and being also produced along the small veins in the direction of the edge of the leaflets, which they at length entirely cover.

Culture.

The roots of *B. insignis* are of a remarkably brittle nature, and great care must be taken in repotting; if that operation is done in a careless manner a certain quantity of roots are mutilated, and the chances are that the plant will never recover. The compost which it prefers is a mixture of fibrous peat and loam in equal parts, with the addition of some sharp sand; it also requires thoroughly good drainage, as it should receive plenty of water at the roots and on the stem. It is usually propagated from spores, which germinate freely.

B. insignis—in-sig′-nis (remarkable), *Hooker*.

This very handsome and interesting, greenhouse Tree Fern, of small dimensions, was for a long time thought to be peculiar to Hong-Kong, where it was first discovered: it was, however, subsequently found growing in pine forests in Burmah, and in Khasya, where, according to Beddome, it may be met with at an elevation of 4000ft. It forms a somewhat stout stem, which is seldom perfectly straight, and which, when fully developed, attains a height of 4ft., measures about 2ft. in circumference, and is covered with narrow, ferruginous (rusty) scales ½in. to 1in. long. The fronds, which are not unlike those of a Lomaria in general appearance, are abundantly produced, and borne on firm stalks 3in. to 4in. long, naked, and scaly only at the base; they are 2ft. to 3ft. long, 8in. to 12in. broad, and simply pinnate (only once divided to the midrib). The barren pinnæ (leaflets), of a leathery texture and of a bright green colour on the upper surface, but of a greyish hue and showing peculiar markings on their under-side, are narrow-spear-shaped, 4in. to 6in. long, nearly sessile (stalkless), and finely toothed on their margins. The beauty of the plant is enhanced by its fronds being of a beautiful metallic colour when partly developed. In the fertile fronds the pinnæ are much contracted.—*Hooker*, *Species Filicum*, v., p. 162. *Nicholson*, *Dictionary of Gardening*, i., p. 208. *Lowe*, *Ferns British and Exotic*, iv., t. 49. *Beddome*, *Ferns of British India*, t. 139.

CÆNOPTERIS—Cæn-op′-ter-is. *See* **Asplenium.**

CALLIPTERIS—Cal-lip′-ter-is. A genus of stove Ferns, founded by Houlston and Moore upon the sub-genus *Diplazium*, which is now included under *Asplenium*.

CAMPTERIA—Camp-te′-rĭ-a. *See* **Pteris.**

CAMPTODIUM—Camp-to′-dĭ-um. *See* **Nephrodium.**

CAMPTOSORUS—Camp-tos-o′-rus. *See* **Scolopendrium.**

CAMPYLONEURON—Camp-yl-on-eur′-on. *See* **Polypodium.**

CHAPTER IV.

CASSEBEERA, *Kaulfuss.*

(Cas-seb-ee′-ra.)

NLY three species, all of Brazilian origin, are embraced in this small genus, known as Genus 26 in Hooker and Baker's "Synopsis Filicum," and the name of which is of obscure derivation. The plants are closely related to the better-known Cheilanthes, some of which are also by some authors called Cassebeeras. The distinctive characters of the genus reside in the sori (spore masses) being terminal on the veins, sub-globose (nearly spherical) or oblong, not reaching beyond the branches of a single vein; also in the involucre (covering of the spore masses) being inserted distinctly within the margin, and separate from it, of the same shape as the sorus, and pressed down upon it.

Culture.

All three species require stove treatment, and the soil which suits them best is peat of a sandy nature, allowing a free passage to the water, which should be liberally administered to the roots.

Species.

C. gleichenioides—glei-che-nĭ-ŏ-i′-dēs (Gleichenia-like), *Gardner.*

This very distinct and peculiar Fern, with the habit of a Gleichenia, is a native of the Diamond District, Brazil. Its singular fronds, 6in. to 9in. long and borne on stout, erect, polished stalks 6in. long, are bipinnate (twice divided to the midrib); they are furnished with linear leaflets 1in. to 2in. long, of a leathery texture, and borne on distinct, short stalks.

The leaflets are cut down to the rachis (stalk) into numerous quadrangular pinnules only about one line broad, incurved and rolled over the rachis; sometimes the lower branches are again branched. The sori (spore masses) occupy the whole margin of the segments.—*Hooker*, *Species Filicum*, ii., p. 119.

C. pinnata—pin-na′-ta (pinnate), *Kaulfuss.*

A stove species, of medium size, native of South Brazil, with fronds about 6in. each way and borne on stout, erect, polished, dark brown stalks 6in. to 12in. long. These fronds are simply pinnate (only once divided to the midrib), and furnished with narrow-oblong leaflets 2in. to 3in. long, ¾in. broad when flat, or somewhat divided below, of a coriaceous (leathery) texture, and with both surfaces naked. In the mature plant the edges of the segments are usually much incurved, and the sori (spore masses) are disposed in close rows along the margin.—*Hooker*, *Species Filicum*, ii., p. 119.

Fig. 6. Cassebeera triphylla (nat. size).

C. triphylla—triph-yl′-la (three leaves to a stalk), *Kaulfuss.*

This stove species, native of South Brazil and Monte Video, is totally distinct from the foregoing two species. It is of much dwarfer habit—its fronds, including their blackish, naked, polished stalks, of a wiry, slender nature, not exceeding about 4in. in length. The leafly portion, about ¾in. each way, is digitate (Fig. 6), being formed of from three to five linear-oblong, leathery segments of nearly equal length, with both surfaces naked and sori (spore masses) disposed in close rows along the margin.—*Hooker*, *Species Filicum*, ii., p. 118.

CERATODACTYLIS—Cer-at-od-ac′-tyl-is. *See* **Llavea.**

CHAPTER V.

CERATOPTERIS, *Brongniart.*

(Cer-at-op′-ter-is.)

Floating Stag's-Horn Fern.

BY some authors this very anomalous genus is regarded as a distinct sub-order, and by others it is placed in *Polypodieæ*. It derives its name from *keras*, a horn, and *pteris*, a Fern, on account of the singular appearance of the fructification, and forms Genus 32 in Hooker and Baker's "Synopsis Filicum." *Ceratopteris* is composed of a solitary very curious and handsome, stove species, *C. thalictroides*, of annual growth. The sori (spore masses), which are produced in abundance, are placed on two or three veins running down the frond longitudinally, and are nearly parallel with both the edge and the midrib; they are covered by an involucre formed of the reflexed margin of the frond, turned back in such a way that the two sides meet against the midrib. The capsules, which are stalkless and nearly spherical, are scattered on the receptacles and provided with a ring, which is sometimes entire, incomplete, or even obsolete.

Culture.

Eaton, in his excellent work on North American Ferns, says (p. 256): *C. thalictroides* "is an annual, growing from the spore, forming its prothallus with the antheridia and archegonia producing its embryo, and growing first into a plantlet with minute, obovate fronds, and soon into a mature plant, buoyed up by the spongy leaf-stalks of its fronds, and later on sending up into the air fully-developed sterile and fertile fronds, and at last dying and contributing its proportion of decaying vegetable matter to its native lagoons." In a cultivated state the spores must be preserved; they

require to be sown early in the spring, in some very moist loam, where they will germinate and grow freely. When sufficiently strong, the seedlings should be plunged into the water so that the little crowns are quite covered. The plant may also be increased by pegging on to the surface of moist soil the numerous bulbils with which its barren fronds are quite covered, and which soon produce a crop of young plants of rapid growth. It succeeds best when the pot containing it is plunged to the rim in water of a uniform temperature of from 60deg. to 65deg.

C. thalictroides—thal-ic-trŏ-i′-des (Thalictrum-like), *Brongniart.*

This most interesting Fern, which, according to Eaton, is found floating on the waters of Prairie Creek and on the head-waters of the St. John's River, in Florida, is also a native of the slowly-moving and quiet waters of the Tropics, from Mexico and the West Indies southward to Brazil ; also from the Punjaub to Tropical Australia, Madagascar, Angola, and Western Tropical Africa. Eaton, in the history of this extraordinary Fern, says that Curtis records having found it "somewhere in the vast inundated prairie regions north of the Everglades, floating free in water 10ft. deep, exactly like a Psitia and Azolla." Its fronds, of a succulent or fleshy texture, are arranged in rosettes, each having roots of its own ; they are borne on thick, inflated stalks filled with large air-cells, and are of two totally distinct characters : the barren ones floating, simple or slightly divided when young, twice or three times divided into narrow segments when mature, of a cheerful light green colour, and highly proliferous ; the fertile ones, bi- or tripinnate (twice or three times divided to the midrib), are of upright habit and frequently attain 1½ft. in height. Both kinds of fronds are produced from a thick, fleshy crown, which should always be kept in water.—*Hooker*, *Species Filicum*, ii., p. 236. *Nicholson*, *Dictionary of Gardening*, i., p. 297. *Eaton*, *Ferns of North America*, t. 80. *Beddome*, *Ferns of Southern India*, t. 75.

CEROPTERIS—Ce-rop-ter′-is. *See* **Gymnogramme.**

CETERACH—Ce′-ter-ach. *See* **Asplenium.** *C. officinarum* is a synonym of *Asplenium Ceterach.*

CHAPTER VI.

CHEILANTHES, *Swartz.*

(Cheil-anth′-ēs.)

Lip Fern.

THIS somewhat extensive genus is composed of mostly delicate-looking Ferns, the majority of which are of small dimensions and of a brittle nature. In Hooker and Baker's "Synopsis Filicum" *Cheilanthes* forms Genus 25, which, we are informed, comprises many species extending beyond the Tropics, with fronds tri- or quadripinnatifid (three or four times divided to the midrib) and of a sub-coriaceous (somewhat leathery) texture. The name is derived from *cheilos*, a lip, and *anthos*, a flower; in reference to the indusium (covering of the spore masses). All the plants included in the genus have their veins free, and a further distinctive character of *Cheilanthes* resides in the disposition of the sori (spore masses), which are terminal or nearly so on the veins, small, and semi-spherical at first, but becoming more or less confluent afterwards; their involucre (covering), which is formed from the reflexed margins of the segments, forms roundish and distinct little pouches, as may readily be seen in *C. myriophylla* and also in *C. hirta*, or sometimes partly connected together, as in *C. argentea*, but not quite continuous.

Formerly, various Ferns partaking of the above-mentioned characters were considered as representing several distinct genera according to the divisions of their fronds, the smooth or hairy character of their various parts, and the nature of their under-side, which in some plants is perfectly naked and in other cases is thickly covered with a white or yellow, ceraceous (waxy) powder.

These so-called genera are now simply regarded as sections of the genus *Cheilanthes*, and are classed as follows :

ADIANTOPSIS—Ad-ĭ-ant-op′-sis, *Fée.* The plants of this section have their involucres distinct, roundish, and confined to the apex of a single veinlet ; the stalks of their fronds are mostly of a glossy nature and of a dark brown colour, similar to those of the generality of Adiantums. The best-known plant in the section is probably *C. radiata*, usually found in collections under the name of either *Adiantum* or *Adiantopsis radiata.*

ALEURITOPTERIS—Al-eu-ri-top′-ter-is, *Fée.* In this section the fronds are less finely divided than those of the other three sections of which the genus is formed ; their under-side is more or less densely coated with a white or yellow powder of a ceraceous nature ; their stalks are usually scaly, especially when young ; and the involucres are more or less confluent (not so distinctly separated as in the other sections). *C. farinosa*, or, as it is commonly called, *Aleuritopteris mexicana*, is a very good illustration of the distinctive characters.

ALLOSORUS—All-os-o′-rus, *Presl* (in part). The plants which by former authorities were given as forming under this name a section of the genus *Cheilanthes*, are now recognised either as *Cryptogramme* of R. Brown, or as forming a sub-division of the genus *Pellæa*, with which they have a much greater affinity.

EUCHEILANTHES—Eu-cheil-anth′-ēs (true *Cheilanthes*), *Hooker.* It is in this section that we find the most popularly-known species, with glossy fronds, such as *C. microphylla* and *C. Sieberi.* None of the plants contained in it have the under-surface of their fronds suffused with any powder ; the stalks are sometimes scaly throughout, or more or less scaly only towards the base ; the segments are larger and flatter than in *Physapteris ;* and the involucres are more or less confluent, though never quite continuous.

PHYSAPTERIS—Phy-sap′-ter-is, *Presl*, or MYRIOPTERIS—Myr-ĭ-op′-ter-is, *Fée.* This is the section in which we find the plants with fronds of a tomentose (woolly) nature, most finely divided, their bead-like ultimate segments being, in some instances, particularly small—most of them, such as *C. myriophylla* and *C. tomentosa*, being among the gems of the most popularly-grown species of *Cheilanthes.* In nearly all cases the stalks are either woolly or scaly and the involucres confluent, though the latter do not form a continuous line.

The genus *Cheilanthes*, which embraces plants suitable for growing in the cool-house as well as others adapted for the tropical Fernery, is very closely related to *Nothochlæna* and also to *Pellæa*, both of which, though very similar in general appearance, are possessed of sufficiently distinct characters to be separated from it.

Culture.

This most interesting genus, of which there is no British representative, is strikingly distinct, and includes some of the most elegant and beautiful forms of Ferns in cultivation. They are all of an evergreen nature, and, although coming principally from tropical countries, the majority of them thrive best in a house where the temperature seldom exceeds 60deg. with artificial heat; a good many of them are even suited with a greenhouse temperature of 45deg. minimum in winter. This is no doubt owing to their being found in their native habitats at great elevations and in dry, rocky, exposed situations. Anyhow, wherever Cheilanthes are seen at a disadvantage and in bad condition, it is invariably due to their being kept in an over-heated, close stove, and frequently syringed—treatment which produces shapeless, emaciated plants deprived of all beauty. They should be grown as near to the light as possible, either on shelves against the glass, or in hanging baskets suspended from the roof, for which purpose some of them are very well adapted. No overhead watering or syringing should at any time be allowed, as this is quite as injurious to all of them as any extra heat; but they should be supplied with an abundance of water at the roots, and for this purpose they must be either potted or basketed in good fibrous peat and sand, with their crowns kept well above the rim of the pot. The compost should be very porous, and to that effect a small portion of sandstone and charcoal broken up into little pieces should be added to it. For the successful management of these charming Ferns, the two great evils to be avoided are strong, close heat and overhead moisture, and the points most beneficial to their welfare are abundance of water at the roots, an open, porous compost for them to grow in, a somewhat airy atmosphere, and plenty of light overhead. Most of the Cheilanthes, if not all, reproduce themselves freely and true from spores, which germinate very readily and form young plants in a comparatively short time.

Principal Species and Varieties.

C. alabamensis—al-ab-a-men′-sis (from Alabama), *Kunze.*

The remarkably pretty plant usually grown under this name, and extensively known in North America as the "Alabama Lip Fern," is *Pellæa alabamensis* of Baker, under which name it will be found described.—*Hooker, Synopsis Filicum*, p. 148.

C. (Eucheilanthes) allosoroides—Eu-cheil-anth′-ēs ; all-os-o-rŏ-i′-dēs (Allosorus-like), *Mettenius.*

A very pretty, greenhouse species, native of Mexico, somewhat similar in habit to the commoner *C. Sieberi*, but less rigid and with the involucres (spore coverings) more confluent. Its fronds, 4in. to 6in. long, about 2in. broad, somewhat spear-head-shaped, and bipinnatifid (twice divided nearly to the midrib), are borne on erect, wiry stalks 2in. to 3in. long, densely scaly at the base, and of a bright chestnut-brown colour. The pinnæ, also spear-shaped, are cut down to the rachis (stalk of the leafy portion) into several sharp pinnules (leafits), which are cuneate (wedge-shaped) at the base and slightly lobed below ; these are of a sub-coriaceous (somewhat leathery) texture, and the involucres, narrow and of a greenish colour, are nearly continuous.—*Hooker, Synopsis Filicum*, p. 137.

C. (Eucheilanthes) arabica—Eu-cheil-anth′-ēs ; ar-ab′-ic-a (from Arabia), *Decaisne.*

A greenhouse species, of dwarf dimensions, also known as *C. coriacea*, native of Arabia and Abyssinia, with fronds only 2in. to 3in. long, bi- or tripinnatifid (twice or thrice cut partly to the midrib), borne on wiry, erect stalks 1in. to 3in. long, of a dark chestnut-brown colour and woolly nature. The leaflets, usually opposite, of a somewhat leathery texture and about ½in. long, are cut about half-way down to the midrib into numerous linear-oblong segments, or again slightly branched at the base. The very abundant sori (spore masses) are covered by an involucre that is more continuous than is the case in *C. fragrans*, described further on.—*Hooker, Species Filicum*, ii., p. 109.

Cyathea medullaris

(much reduced).

C. (Aleuritopteris) argentea—Al-eu-ri-top′-ter-is ; ar-gen′-tĕ-a (silvery), *Hooker.*

This is a well-known and much-appreciated, greenhouse species, native of Siberia, Japan, China, the Malayan Peninsula, and Khasya, where it is found at various elevations up to 5500ft. Its pretty fronds, 3in. to 4in. long and deltoid (in shape of the Greek delta, Δ), are bi- or tripinnatifid, the upper part not being cut down to the midrib. The lower leaflets, much the largest, are cut down nearly to the midrib, and their lowest pinnules (leafits) are sinuately pinnatifid (waved and cut partly to the midrib). Their upper surface is of a bright, dark shining green, while their under-side is covered with a ceraceous (waxy) powder of a pale lemon or straw colour at first, but which becomes gradually as white as snow. The numerous very small sori (spore masses) are blackish, united at the base, and marginal. The curious contrast formed by the black marginal line running all round the divisions of the frond, produced by the presence of the spore masses, is remarkable in the extreme, the effect being very pleasing. Fig. 7 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker, Species Filicum*, ii., p. 76. *Nicholson, Dictionary of Gardening*, i., p. 307. *Lowe, Ferns British and Exotic*, iv., t. 12. *Beddome, Ferns of British India*, t. 143.

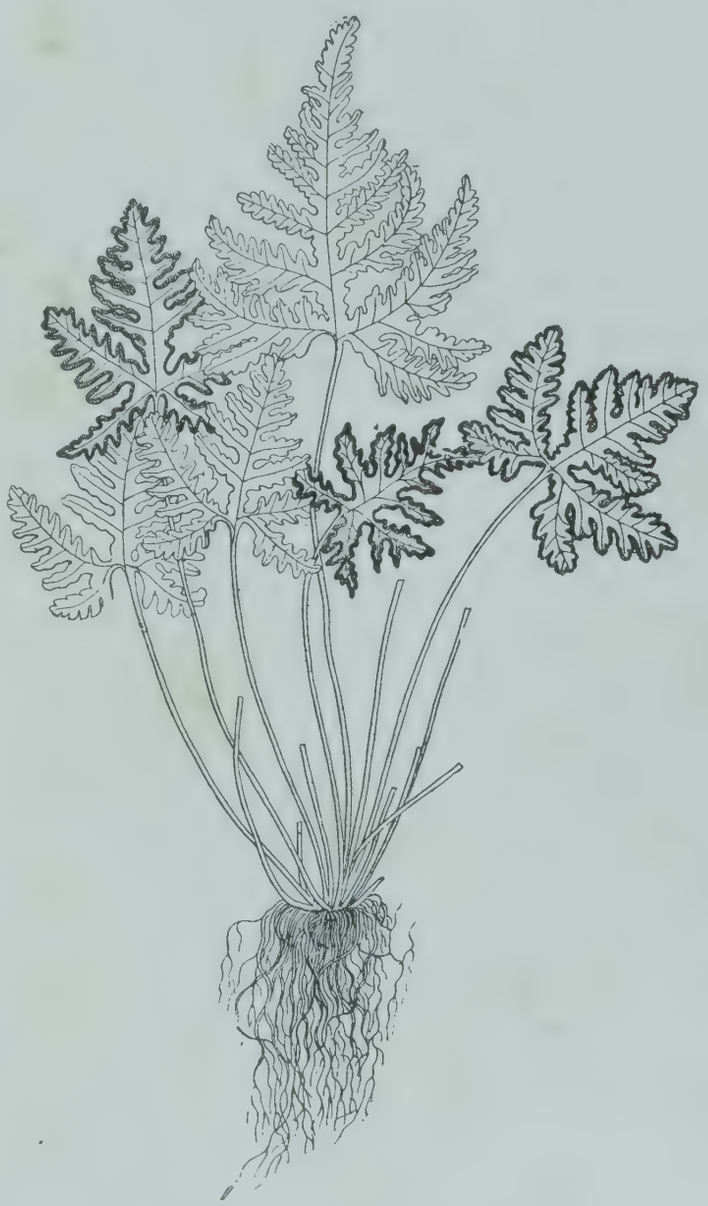


Fig. 7. Cheilanthes argentea (½ nat. size).

C. a. chrysophylla—chry-soph-yl′-la (golden-leaved), *Hooker.*

A variety with pinnules (leafits) more nearly equal, disposed in numerous opposite pairs, the frond narrower and longer, densely coated with yellow, not white, ceraceous (waxy) powder on the under-side.—*Hooker*, *Species Filicum*, ii., p. 113.

C. (Aleuritopteris) aurantiaca — Al-eu-ri-top′-ter-is ; aur-an′-tĭ-ac-a (orange-coloured), *Moore.*

A very handsome, greenhouse species, native of Mexico, with fronds 4in. to 8in. long and 2in. to 3in. broad, borne on polished stalks 1in. or 2in. long and of a chestnut-brown colour. They are bipinnate (twice divided to the midrib), with opposite leaflets, the lower ones spreading, spear-shaped, 1in. to 1½in. long, ¾in. broad, cut down nearly to the midrib into numerous, linear-oblong, entire or slightly-notched pinnules (leafits). The upper surface is naked, and the lower one densely coated with bright orange meal.—*Hooker*, *Species Filicum*, ii., p. 114.

C. (Aleuritopteris) aurea — Al-eu-ri-top′-ter-is ; au′-rĕ-a (golden), *Baker.*

This lovely, dwarf-growing, stove species, more generally known under the name of *C. Borsigiana*, is a native of Peru and Guatemala. Its fronds, about 3in. long and deltoid (in the shape of the Greek delta, Δ), are borne on tufted stalks 2in. to 3in. long, ebeneous and slightly scaly. They are twice or three times pinnatifid (cut nearly to the midrib), with leaflets deltoid, the lowest much the largest, decreasing in length towards the summit of the frond. The under-surface is densely covered with a rich yellow powder, while the upper one is sparingly covered with yellow meal, especially along the veins. The involucres (coverings of the spore masses) are broad and of a membranous (parchment-like) nature.—*Hooker*, *Synopsis Filicum*, p. 476. *Lowe*, *New and Rare Ferns*, t. 16A.

C. (Aleuritopteris) Borsigiana — Al-eu-ri-top′-ter-is ; Bor-sig-ĭ-a′-na (Borsig's). Synonymous with *C. aurea.*

C. Bradburii—Brad-bu′-rĭ-i (Bradbury's). Synonymous with *C. tomentosa.*

C. (Eucheilanthes) bullosa—Eu-cheil-anth′-ēs ; bul-lo′-sa (blistered or puckered), *Kunze.*

A greenhouse species, native of South Hindostan and the Neilgherries, where, according to Beddome, it is very common. Its fronds, 6in. to 9in. long and 2in. to 3in. broad, are borne on densely-tufted stalks 4in. to 8in. long, of a dark chestnut-brown colour, slightly woolly below, and clothed with spear-shaped scales their whole length. They are furnished with numerous leaflets disposed in opposite pairs, the lower ones 1½in. apart, 1½in. long, ¾in. broad, and spear-shaped. The pinnules (leafits) on the lower side are the largest, and are cut down nearly to the midrib into numerous linear-oblong segments of a somewhat leathery texture. The abundant sori (spore masses) are covered by involucres of a pale brown colour.—*Hooker, Species Filicum*, ii., p. 88, t. 96A. *Beddome, Ferns of Southern India*, t. 192.

C. (Adiantopsis) californica — Ad-ĭ-ant-op′-sis ; cal-if-or′-nic-a (Californian), *Mettenius.*

This exceedingly pretty Fern, commonly known in North America under the name of "Californian Lip Fern," is found in moist and shady ravines and cañons, and known only from the coast ranges of the Southern part of California and from Sonora, in Mexico. Its elegant fronds are borne on densely-tufted, erect stalks about 6in. long and of a glossy nature, and proceed from a short-creeping rootstock that is very chaffy with rigid, narrow scales of a peculiar dark brown colour ; they are deltoid (in the shape of the Greek delta, Δ), about 3in. each way, and quadripinnatifid (four times divided half-way to the midrib). The leafits of the lower side, which are much larger than the others, are cut down to the midrib into numerous segments, which are again very sharply cut nearly to the centre. The sori (spore masses), which are roundish, and disposed from two to six to a segment, are usually placed at the base of the sinuses (depressions) at the ends of single veinlets. Eaton, in his excellent work on North American Ferns, says that by its general habit this extremely pretty and delicate little Fern reminds one of the rare *Cystopteris montana*, but that its fronds are of firmer texture and still more finely divided. He also adds that : "There is no other North American Fern which resembles it, even slightly" ; that "*C. Schimperi* of Kunze, from Abyssinia, and *C. incisa*, equally of Kunze, from Brazil, are its

nearest allies"; and that "these three species form a good subordinate group of the sub-genus *Adiantopsis*." Hooker describes the same plant and figures it in *Species Filicum*, ii., p. 71, t. 88A, under the name of *Aspidotis californica*, forming by itself a subdivision of the genus *Hypolepis*.—*Eaton*, *Ferns of North America*, i., t. 6.

C. candida—can′-did-a (pure white). The plant found in gardens under this name is *Nothochlæna candida* of Mettenius.

C. (Adiantopsis) capensis — Ad-ĭ-ant-op′-sis ; ca-pen′-sis (from the Cape), *Swartz*.

This very pretty, greenhouse species, native of Cape Colony, differs from all others by the more herbaceous (thin and papery) texture of its fronds, which are borne on tufted, erect stalks 4in. to 6in. long, naked, and of a dark chestnut-brown colour. These fronds are 4in. to 6in. long, 3in. to 4in. broad, and bipinnatifid (twice divided half-way to the midrib) ; the lower pinnæ (leaflets), which are much the largest, have their pinnules (leafits) on the lower side larger than the others, and cut down below to a narrowly-winged stalk into oblong, blunt, nearly entire segments about ¼in. long. The small and abundant sori (spore masses) are disposed all round the edge of the segments, and are covered by ciliated (hairy) involucres.—*Hooker*, *Synopsis Filicum*, p. 132. *Nicholson*, *Dictionary of Gardening*, i., p. 307. *Lowe*, *New and Rare Ferns*, t. 26A. Hooker also describes and figures this plant under the name of *Hypolepis* in *Species Filicum*, ii., p. 72, t. 77C.

C. (Adiantopsis) chlorophylla—Ad-ĭ-ant-op′-sis ; chlo-roph-yl′-la (green-leaved), *Swartz*.

This stove species, native of South America, from New Granada southward to Monte Video, is a very handsome plant, and perhaps the most robust-growing of the section to which it belongs. Its somewhat spear-shaped and tripinnatifid fronds, 1ft. to 1½ft. long and 4in. to 6in. broad, produced from a stout, scaly rhizome (prostrate stem), are borne on strong, erect, naked, polished stalks 1ft. to 1½ft. long, of a dark chestnut-brown colour. The leaflets, 3in. to 5in. long and ¾in. to 1½in. broad, are spear-shaped and somewhat distantly placed ; their pinnules (leafits), equally spear-shaped, are

cut down to the midrib into entire, narrow-oblong segments, on both edges of which the numerous small and roundish sori (spore masses) are uniformly disposed.—*Hooker*, *Species Filicum*, ii., p. 73, t. 88B. *Nicholson*, *Dictionary of Gardening*, iv., p. 514.

C. chusana—chu-sa′-na (from Chusan). Synonymous with *C. mysurensis.*

C. (Eucheilanthes) Clevelandi — Eu-cheil-anth′-ēs ; Cleve-land′-i (Cleveland's), *Eaton.*

A very handsome, greenhouse species, native of North America, where it is popularly known as "Cleveland's Lip Fern." According to Eaton, it was discovered in 1874 on a mountain about forty miles from San Diago, California, at an elevation of about 2500ft., and in the San Bernardino range a year later. Its pretty and delicate-looking fronds, 4in. to 12in. long and borne on tufted, erect, scaly stalks, are produced from a creeping rootstock nearly as thick as a goose-quill, several inches long, covered with closely-pressed, rigid-pointed, nearly black scales ; they are tri- or quadri-pinnate (three or four times divided to the midrib), with the ultimate divisions of the leaflets nearly round (Fig. 8), small, deep green above, and covered with fine white scales beneath. The numerous sori (spore masses) are disposed in interrupted series on the edges of the segments. —*Eaton*, *Ferns of North America*, i., t. 12. *Nicholson*, *Dictionary of Gardening*, i., p. 308.

Fig. 8. Cheilanthes Clevelandi
(¼ nat. size)

C. (Physapteris) contigua—Phy-sap′-ter-is ; con-tig′-ŭ-a (contiguous), *Baker.*

A greenhouse species, of medium dimensions, native of Port Darwin, North Australia, and closely related to the well-known *C. tenuifolia*, from which it

differs principally through its more rigid texture, the peculiarly woolly nature of its stalks, and the crowded way in which its somewhat wedge-shaped segments are disposed.—*Hooker*, *Synopsis Filicum*, p. 476.

C. (Eucheilanthes) Cooperæ — Eu-cheil-anth′-ēs ; Coo′-per-æ (Mrs. Cooper's), *Eaton.*

This pretty and delicate-looking, greenhouse species, native of North America, where it is popularly known as "Mrs. Cooper's Lip Fern," grows, according to Eaton, in clefts of rocks and on mountain-sides near Santa Barbara and near San Bernardino, in California. The plant has a certain affinity with *C. vestita* of Swartz, a native of Illinois and Georgia, but it is distinguished by its bearing glandulous hairs, also by the short rootstock, of an ascending rather than creeping nature, and covered, especially when young, with narrow, crisped scales of a peculiarly dark brown colour.—*Eaton*, *Ferns of North America*, i., t. 2.

C. coriacea—cor-ĭ-a′-cĕ-a (leathery). Synonymous with *C. arabica.*

C. (Eucheilanthes) cuneata — Eu-cheil-anth′-ēs ; cun-ĕ-a′-ta (wedge-shaped), *Link.*

This rare and interesting, greenhouse species, which in Continental gardens is frequently met with under the name of *C. rufescens*, is a native of Mexico, where it is found at an altitude of 7000ft., from Oaxaca to Cerro de Pinel, Sierra Madre, Sierra San Pedro, Nolasca, and Talca. Its fronds, glabrous (smooth and shiny), of a somewhat leathery texture, and dull green in colour, are tri- or quadripinnate (three or four times divided to the midrib) ; they are wedge-shaped or broadly egg-shaped in form, 1ft. to 1½ft. long, of which more than half is naked, with leaflets and leafits equally egg-shaped and sharply pointed, while the ultimate segments into which these are divided are all sharply pointed. The stalks on which the fronds are borne are of a glossy red, turning blackish with age. The spore masses are continuous all along the margins of the segments.—*Lowe*, *Ferns British and Exotic*, iv., t. 27.

C. (Eucheilanthes) Dalhousiæ—Eu-cheil-anth′-ēs ; Dal-hou′-sĭ-æ (Lady Dalhousie's), *Hooker.*

This pretty, greenhouse species appears to be closely allied to *C. farinosa* (of which it may possibly be but a denudate variety with larger and more

membranous fronds always destitute of powdery substance); it is a native of Northern Hindostan and the Himalayas, where it ascends to 10,000ft., and, according to Beddome, it is also common in woods near Makoorty, in the Neilgherries. Its fronds, 6in. to 12in. long and 3in. to 4in. broad, are borne on densely-tufted, wiry, polished stalks of a dark chestnut-brown colour, covered with narrow scales when young; they are tripinnatifid (three times divided half-way to the midrib), and furnished with numerous leaflets of a soft, papery texture, disposed in opposite pairs, the lowest 2in. to 3in. long and 1in. to 1½in. broad. The pinnules (leafits) on the lowest side are the largest, sometimes 1in. long, blunt and deeply pinnatifid. The abundant sori (spore masses) are roundish and small.—*Hooker*, *Species Filicum*, ii., p. 80. *Beddome*, *Ferns of Southern India*, t. 193.

C. dealbata—dĕ-al-ba′-ta (whitened). Synonymous with *C. farinosa.*

C. (Adiantopsis) dichotoma—Ad-ĭ-ant-op′-sis; dich-ot′-om-a (dichotomous, or repeatedly divided into two), *Swartz.*

This stove-species, of comparatively strong habit, native of Quito, Brazil, and Uruguay, is remarkably distinct from all others in its mode of growth and in the singular division of its fronds. These fronds are 1ft. to 1½ft. long, 4in. to 6in. broad, and borne on densely-tufted, slender stalks 4in. to 6in. long and of a dark chestnut-brown colour. They are oblong in shape and three or four times divided to the rachis (stalk of the leafy portion), which, like the secondary stalks, is very slender, tortuous, and furnished with deltoid (in the shape of the Greek delta, Δ) leaflets 2in. to 3in. long. The leaflets are divided into oblong-spear-shaped pinnules (leafits) that are again cut down into a few segments ternately divided (arranged by threes), or even again slightly branched at the base. The roundish and distinct sori (spore masses) are disposed all along the margins of the segments.—*Hooker*, *Species Filicum*, ii., p. 104, t. 102B.

C. (Physapteris) Eatoni—Phy-sap′-ter-is; Eat′-on-i (Eaton's), *Baker.*

A very distinct and pretty, greenhouse species, native of North America, where, according to Eaton, it is found in Texas and New Mexico; near Cañon City, Colorado; and from the Rio Grande westward along the Gila,

on the Colorado River. The kind of spot where it has been collected is not recorded, but it probably grows in the clefts of rocks along the sides and edges of cañons. In general appearance it is somewhat similar to the better-known *C. tomentosa*, but smaller in all its parts ; it also differs from that species in being coated with rather rigid-pointed scales instead of mere woolly hairs on the stalks and midrib of the leaflets beneath, and in being matted with tomentum (flocks of wool) on the upper surface of its fronds. These fronds, 3in. to 8in. long and at the most 1½in. to 2in. broad, are produced from a short, ascending rootstock, and borne on upright, wiry stalks 3in. to 6in. long and densely clothed with pale brown scales ; they are furnished with leaflets of a coriaceous (leathery) texture, the lower ones distant, alternate or opposite. The numerous pinnules (leafits), linear-oblong in shape and pinnatifid (cut partly to the midrib), are closely set, and their margin is conspicuously incurved. The scales covering the stalks and their secondary divisions are short, broad, and very conspicuous in young fronds : in older fronds they fall away to some extent and are less abundant. —*Hooker*, *Species Filicum*, ii., p. 96, t. 109. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Eaton*, *Ferns of North America*, i., t. 45.

C. elegans—e′-leg-ans (elegant). Synonymous with *C. myriophylla*.

C. Ellisiana—El-lis-ĭ-a′-na (Ellis's). A variety of *C. hirta*.

C. (Aleuritopteris) farinosa—Al-eu-ri-top′-ter-is ; far-i-no′-sa (mealy), *Kaulfuss*.

This magnificent, stove species (see Plate), frequently found in gardens under the name of *Aleuritopteris mexicana*, has a very extensive habitat, for it is found in Africa, on the Cameroon Mountains, in Zambesi Land, Abyssinia, &c. ; in the Malayan Peninsula, Java, and the Philippine Islands ; in Brazil and Mexico up to 8000ft. elevation ; in Guatemala and New Granada ; on the Himalayas at 7000ft. elevation ; and Beddome says that on the Neilgherries, and in other mountainous districts of the Madras Presidency, where it is called the "Silver Fern," it is very common, and also that there is a variety with the powder of a pale sulphur-yellow. This species is very variable in size, its fronds ranging from 3in. to 12in. in length and 3in. to 6in. in breadth, and being borne on densely-tufted stalks 3in. to 6in. long,

of a dark chestnut-brown colour, and clothed with narrow scales when young; they are usually spear-shaped, sometimes deltoid (in shape of the Greek delta, Δ), and bi- or tripinnatifid (twice or three times divided half-way to the midrib); the leaflets, of a somewhat leathery texture, are disposed in opposite pairs, the lowest ones often much the largest, with the lowest pinnules (leaflits) longer than the others and deeply pinnatifid, most of the others having a broad, entire central space. In mature fronds the under-surface is densely covered with pure white powder; their upper surface is of a dull green, slightly speckled with white. The small, brown sori (spore masses) are placed in a continuous line along the edges, their indusia (coverings) extending throughout every fertile segment of the frond. *C. dealbata* is another name for this species. — *Hooker*, *Species Filicum*, ii., p. 77. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 13. *Beddome*, *Ferns of Southern India*, t. 191.

C. (Physapteris) Fendleri—Phy-sap′-ter-is; Fend′-ler-i (Fendler's), *Hooker.*

This pretty, greenhouse species, closely allied to *C. myriophylla*, is a native of North America, its habitat extending from the Rocky Mountains southward to California and New Mexico: Fournier even says that it occurs in the Valley of Mexico and in Columbia. Its delicate little fronds, 3in. to 4in. long, 1in. to 1½in. broad, are produced from a slender, creeping rootstock, and are borne on wiry, chestnut-brown stalks 2in. to 4in. long and slightly scaly; they are spear-shaped and tripinnatifid (thrice divided nearly to the midrib), the leaflets, about ¾in. long, being cut down to the rachis (stalk of the leafy portion) into numerous nearly sessile (almost stalkless) segments of a beaded nature, small, oblong, generally entire, but occasionally three-lobed, especially the terminal ones or those of the barren fronds. The upper surface is quite naked, and the under-side, though naturally scaly, is not matted. The copious sori (spore masses) are disposed along the margins of the segments.—*Hooker*, *Species Filicum*, ii., p. 103, t. 107B. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Eaton*, *Ferns of North America*, ii., t. 79.

C. ferruginea—fer-ru-gin′-ĕ-a (rusty). The plant grown in gardens under this name is identical with *Nothochlæna ferruginea* of Hooker.

C. (Eucheilanthes) flexuosa—Eu-cheil-anth′-ēs ; flex-ŭ-o′-sa (flexuose, or bending to and fro in opposite directions), *Kunze.*

A pretty, stove species, native of Goyaz, Brazil, with fronds 4in. to 6in. long and borne on tufted, naked stalks 2in. to 4in. long. These fronds are tripinnate (three times divided to the midrib), and furnished with short-stalked, spear-shaped leaflets, the lowest the largest. The leaflets are again divided into flattish, blunt, stalkless segments of a membranous (parchment-like) texture ; they are of a dull green colour on their upper surface and slightly glandulous and pubescent. The small, roundish sori (spore masses) are disposed six to eight on the margins of the largest segments.—*Hooker*, *Synopsis Filicum*, p. 476. *Nicholson*, *Dictionary of Gardening*, i., p. 308.

C. (Eucheilanthes) fragilis—Eu-cheil-anth′-ēs ; frag′-il-is (fragile), *Hooker.*

A stove species, of larger dimensions than *C. mysurensis*, to which species it is, however, closely related. It is a native of Moulmein, where it is found growing on limestone rocks, and where it was discovered by the Rev. C. S. Parish. Its fronds, 6in. to 12in. long and 2in. to 4in. broad, are borne on strong, erect stalks of a woolly nature, and not more than 1in. or 2in. long ; they are somewhat spear-shaped and bipinnatifid (twice divided half-way to the midrib). The numerous leaflets are 1in. to 2in. long, set 1in. to 2in. apart, and cut down to the midrib into numerous narrow, blunt, notched lobes of a papery texture. The small, roundish, and almost continuous sori (spore masses) are covered by pale brown involucres of a parchment-like texture.—*Hooker*, *Filices Exoticæ*, t. 96. *Beddome*, *Ferns of British India*, t. 223.

C. (Eucheilanthes) fragrans—Eu-cheil-anth′-ēs ; fra′-grans (fragrant), *Webb and Berthelot.*

This pretty, evergreen, greenhouse species, of small dimensions, also known under the names of *C. odora* and *C. suaveolens*, is of a very cosmopolitan character. It is found wild in the South of France, Spain, Italy, Greece, Turkey, Madeira, and the whole of the Mediterranean Islands ; also in Afghanistan, Syria, and Algeria ; and we have it on the authority of Beddome that it grows on the Himalayas, where it has been gathered at 5000ft. elevation. Its delicately-cut little fronds are deliciously scented, and retain their agreeable perfume for a very long time when in a dried state ; they are only 2in. to

3in. long, about 1in. broad, bi- or tripinnatifid (twice or three times divided half-way to the midrib), and borne on thin, wiry stalks 1in. to 3in. long and densely clothed with narrow, reddish-brown scales. The leaflets, of a somewhat leathery texture and deltoid (in form of the Greek delta, Δ), are about ½in. long, ¼in. broad, opposite, and cut down to the rachis (stalk of the leafy portion) below into several pinnatifid, linear-oblong lobes. The small and numerous sori (spore masses) are covered by light brown involucres of a parchment-like texture, and toothed all round. Fig. 9 is reduced from Col. Beddome's "Ferns of British India" by the kind permission of the author.—*Hooker*, *Species Filicum*, ii., p. 81. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 17B. *Beddome*, *Ferns of British India*, t. 238.

Fig. 9. Cheilanthes fragrans (½ nat. size).

C. frigida—fri′-gid-a (frigid). Synonymous with *C. lendigera.*

C. glandulosa—glan-dul-o′-sa (glandular), *Swartz.*

A strong-growing, stove species, native of the province of Minas Geraes, in Brazil. Its fronds, 2ft. or more long and quadripinnatifid (four times divided half-way to the midrib), are peculiar through their filiform (thread-like), flexuose (bending), hairy stalks of a somewhat climbing habit. Their leaflets, 3in. long and curved upwards, are shortly stalked and divided into spear-shaped, unequal-sided, and stalkless pinnules (leafits), which are again cut into narrow, wedge-shaped segments with ligulate (strap-shaped) lobes. The abundant spore masses are very minute.—*Hooker*, *Synopsis Filicum*, p. 475.

C. gracilis—grac′-il-is (slender). Synonymous with *C. lanuginosa.*

C. (Physapteris) gracillima—Phy-sap′-ter-is ; grac-il′-lim-a (very slender), *Eaton.*

This very pretty species, which somewhat resembles the better-known *C. lanuginosa*, though its much less hairy and less divided fronds have larger

and less distinctly beaded segments, is essentially a North American species, popularly known as the "Lace Fern of North America." Eaton states that it is found growing in dense masses amongst rocks, mostly at elevations varying between 6000ft. and 8000ft., from the Yosemite Valley to Oregon; also in British Columbia, near the Pend d'Oreille River; and in Missouri, New Mexico, and Guatemala. He adds that, although described from a few small specimens collected by Dr. Newberry in the Cascade Mountains of Oregon, this charming little species was first discovered on the Sacramento River, California, and on the banks of streams in Oregon, by Brackenridge. Its fronds, 3in. to 4in. long and 1in. broad, are narrowly spear-shaped, bi- or tripinnatifid (twice or three times divided half-way to the midrib), and are produced from a rootstock covered with very narrow, slender-pointed scales of a rusty-brown colour; they are borne on densely-tufted, wiry, slender stalks 2in. to 6in. long, of a dark chestnut-brown colour, polished and only slightly scaly towards the base. The leaflets, about ½in. long, ¼in. broad, and of a somewhat leathery texture, are opposite, and cut down to the midrib into several linear-oblong segments on each side, the lowest of which are again slightly divided. The upper surface, of a bright green colour, is naked, but the lower side is densely matted with a woolly tomentum which in young fronds is nearly white, while in the mature ones it is of a dark chestnut-brown colour. The margins of the segments, on which the sori (spore masses) are disposed, are much incurved, and the involucres (coverings of the sori) are of a soft, papery nature, and continuous round the margins.—*Hooker*, *Synopsis Filicum*, p. 139. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Eaton*, *Ferns of North America*, ii., t. 79.

C. (Eucheilanthes) hirta—Eu-cheil-anth′-ēs; hir′-ta (hairy), *Swartz.*

This very handsome, delicate-looking, greenhouse species is a native of the Cape of Good Hope, Port Natal, Graham's Town, Mexico, and the Java Mountains. It is one of the most decorative of the entire genus. Its fronds, of a pale green colour and very brittle nature, are produced from a somewhat erect crown, and borne on strong, erect stalks 2in. to 4in. long, densely coated with spreading, woolly hairs of a bright reddish-brown colour; they are 4in. to 12in. long, 2in. to 5in. broad, spear-shaped, and three times divided half-way to the midrib (Fig. 10). The leaflets, also spear-shaped, are opposite,

and spread from the main stalk at right angles ; they are 1in. to 3in. long, and are cut down to the midrib into numerous pinnules (leafits) which are scarcely more than ¼in. long and again pinnatifid and notched : their margin is much incurved. The abundant sori (spore masses) are distinct and of a bright reddish colour ; they are disposed all round the edge of each segment of the fertile frond, and eventually become confluent.—*Hooker*, *Species Filicum*, ii., p. 92, t. 101B. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 18.

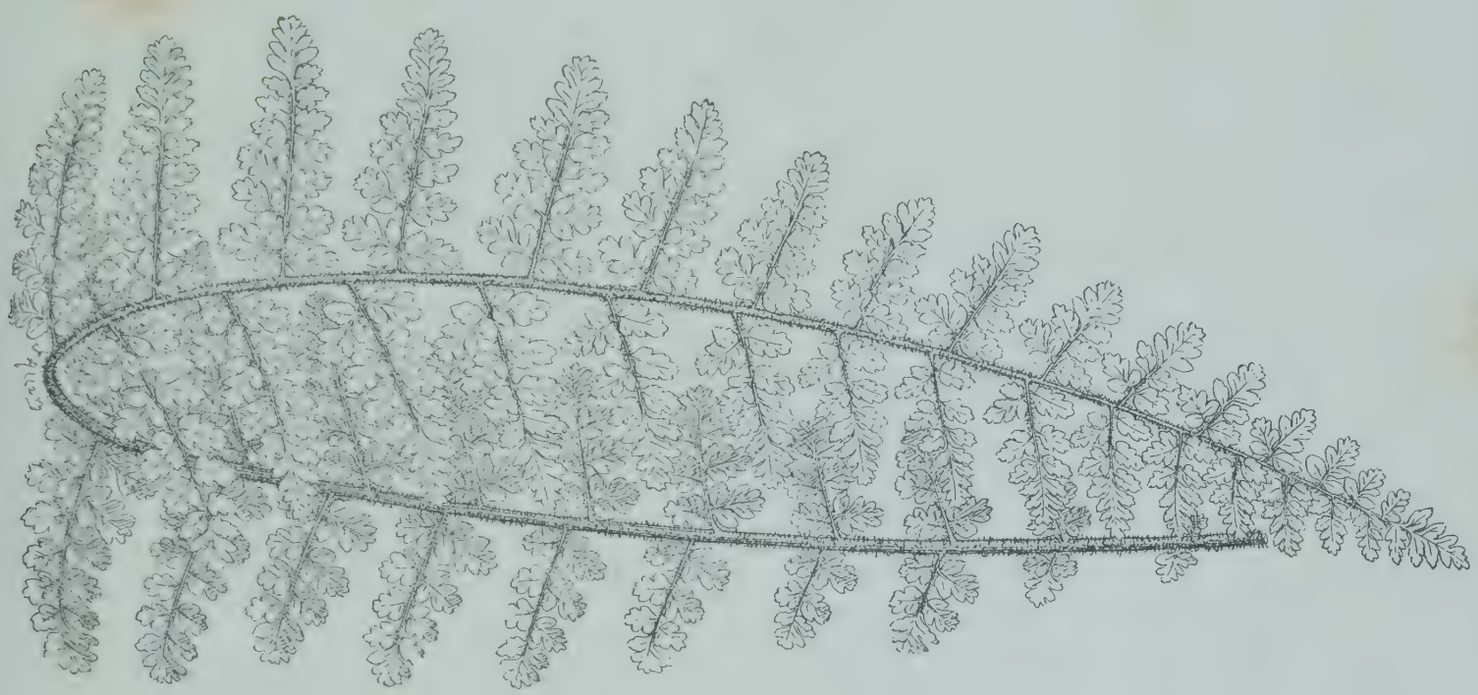


Fig. 10. Frond of Cheilanthes hirta
(nat. size).

This species varies greatly in size and hairiness, the most distinct form being the one generally found in gardens under the name of *C. Ellisiana* of Moore, which has fronds much broader, more finely divided, and of a more upright habit, than those of the typical plant.

C. (Eucheilanthes) hispanica—Eu-cheil-anth′-ēs ; his-pa′-nic-a (Spanish), *Mettenius.*

A greenhouse species, native of Spain, and also found on rocks on the banks of the Mondego, near Coimbra, in Portugal. Its fronds, only about 4in. long, including the wiry, naked, dark chestnut-brown stalks on which they are borne, are deltoid (in the shape of the Greek delta, Δ), and have their

leaflets disposed in opposite pairs, the lowest the largest, oblong or again branched on the lower side. The small and copious sori (spore masses) are disposed all round the segments, which are roundish-oblong and deeply notched.—*Hooker*, *Synopsis Filicum*, p. 136.

C. (Adiantopsis) incisa—Ad-ĭ-ant-op′-sis ; in-ci′-sa (cut), *Kunze*.

A very distinct, greenhouse species, native of South Brazil, with fronds seldom more than 4in. long, including their slender, naked, polished, dark brown stalks. The lower leaflets, of a somewhat leathery texture and about 1in. long, are cut down to the midrib into several oblong pinnules (leafits) with narrow, sharp-pointed segments, on the margin of which the sori (spore masses), few in number and roundish or transversely oblong, are situated.—*Hooker*, *Synopsis Filicum*, p. 133.

C. (Adiantopsis) Kirkii—Ad-ĭ-ant-op′-sis ; Kirk′-ĭ-i (Kirk's), *Hooker*.

A stove species, of singular appearance, native of the Moramballa Mountains, Zambesi Land, where, according to Dr. Kirk, it grows on rocks at elevations varying between 200ft. and 500ft. It is a curious plant, with fronds deltoid (in the shape of the Greek delta, Δ), 4in. to 6in. each way, borne on densely-tufted, erect, naked stalks 6in. to 9in. long, of a chestnut-brown colour, and it has entirely the habit and other characters of the popular *Pellæa* (*Pteris*) *geraniæfolia*, from which it is distinguished only by its mode of fructification, the small and roundish sori (spore masses) being disposed all round the margin of the segments, where they are not confluent.—*Hooker*, *Second Century of Ferns*, t. 81.

C. (Eucheilanthes) Kuhnii — Eu-cheil-anth′-ēs ; Kuhn′-ĭ-i (Kuhn's), *Milde*.

A greenhouse species, native of China, and very similar to *C. subvillosa*, from which it differs only through its being of smaller dimensions and through its fronds being covered with a glandular pubescence (down).—*Hooker*, *Synopsis Filicum*, p. 476.

C. lanosa—la-no′-sa (woolly). The plant known by this name is identical with *C. lanuginosa*.

C. (Physapteris) lanuginosa—Phy-sap′-ter-is ; la-nu-gin-o′-sa (woolly), *Nuttall.*

This curious and pretty Fern, which thrives best under cool treatment, is known under the appellations of *C. lanosa* of Moore and *C. gracilis* of Riehl, and is essentially a plant of North America, where it is popularly known as the "Woolly Lip Fern." Eaton says it is found in the United States, from Illinois and Wisconsin to Utah, Colorado, New Mexico, and Arizona. According to the same authority, this species was also collected in British Columbia, at the base of the Rocky Mountains, where it grows in dense tufts on dry and exposed rocks and cliffs. Its fronds, usually 4in. to 8in. long, but sometimes much smaller, and 1in. to 1½in. broad, are produced from a short-creeping rootstock, forming a matted mass, and borne on densely-tufted, erect, wiry stalks 3in. to 4in. long, of a very dark chestnut-brown —nearly black—colour, and scantily furnished with spreading, woolly hairs of a light colour. These fronds are somewhat spear-shaped, and bipinnatifid (twice divided half-way to the midrib), being furnished with leaflets disposed in opposite pairs. The leaflets, of a somewhat leathery texture, are divided into linear-oblong pinnules (leafits), which in their turn are cut down to the stalk into numerous small, roundish or oblong segments having their margin conspicuously incurved. The upper surface, of a grass-green colour, is scantily furnished with whitish, webby hairs, while the lower side is heavily covered with a coat of pale brown, matted wool, the fibres of which are flattened and plainly articulated. The copious sori (spore masses), disposed around the edges of the segments, are covered by involucres which can only be seen by carefully removing the wool, and are then found to be almost continuous round the lobule and formed of its scarcely-changed, herbaceous (soft, papery) margin.—*Hooker*, *Species Filicum*, ii., p. 99. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Eaton*, *Ferns of North America*, i., t. 6.

C. (Physapteris) lendigera—Phy-sap′-ter-is ; len-dig′-er-a (maggot-bearing), *Swartz.*

This very handsome, stove species, usually found in gardens under the name of *C. frigida*, is a native of Mexico, where it is found at elevations varying between 6000ft. and 11,000ft. It is particularly adapted for growing in small hanging baskets, as its fronds, produced from a short-creeping

rhizome (prostrate stem), have a decidedly pendulous habit. They are from 4in. to 12in. long, 2in. to 4in. broad, spear-shaped, tri- or quadripinnatifid (three or four times divided half-way to the midrib), and borne on strong, polished stalks 4in. to 12in. long, of a chestnut-brown colour and liberally clothed with rusty-brown hairs. The numerous leaflets are opposite, 2in. to 3in. long, spear-shaped, and divided into many linear-oblong pinnules (leafits) cut down to the rachis (stalk of the leafy portion) into numerous distinct, convex, small segments of a shining dark green colour on their upper side, while the whole of their under-surface is clothed with narrow, long, brown hairs. The sori (spore masses), almost continuous round the edge of the segments, are covered with membranous (parchment-like) involucres of a peculiar whitish colour.—*Hooker*, *Species Filicum*, ii., p. 95, t. 104. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 24.

C. (Eucheilanthes) leucopoda—Eu-cheil-anth′-ēs ; leu-cop′-od-a (white-footed), *Link*.

A greenhouse species, native of Mexico and Texas, greatly resembling *C. viscosa*, from which it only differs by the pale straw-colour of its stalks and by the herbaceous (soft) character preserved by the lobules, even when these are recurved and form involucres (spore coverings).—*Eaton*, *Ferns of North America*, ii., t. 49. *Hooker*, *Synopsis Filicum*, p. 136.

C. Lidgatii—Lid-gat′-ĭ-i (Lidgate's), *Baker*.

A very curious, strong-growing, greenhouse species, native of Oahu, very distinct from all other known species through its habit, which is similar to that of *Woodwardia radicans*. Its fronds, deltoid (in shape of the Greek delta, Δ), and generally from 1½ft. to 2ft. long, are produced from a creeping rhizome, and borne on straw-coloured, naked stalks about 1ft. long. Their lowest leaflets are the largest, and show three deeply-cut pinnules (leafits) ; all the others are simply spear-shaped, 1½in. to 2in. broad, cut down to a narrow wing into close, ligulate (strap-shaped), blunt lobes, the barren ones slightly toothed. Both surfaces are naked, and the texture is rigidly leathery. The sori (spore masses) are covered by rigid, persistent involucres, and are disposed on the margin of the lobes.—*Hooker*, *Synopsis Filicum*, p. 475.

C. (Physapteris) Lindheimeri—Phy-sap′-ter-is ; Lind-heim′-er-i (Lindheimer's), *Hooker*.

A very pretty, greenhouse species, native of Western Texas, New Mexico, and Arizona, growing probably in crevices of exposed rocks ; it has also been collected in the Sierra Madre of Mexico and near San Luis Potosi. Its fronds, 3in. to 6in. long, 1½in. to 2in. broad, are produced from a thin, slender rootstock, several inches long, very nearly black, and bearing a few rusty-coloured scales at the base, and are borne on wiry, dark chestnut-brown coloured stalks 3in. to 6in. long and thinly clothed with narrow-spear-shaped scales. The leaflets are numerous, spear-shaped, and cut into many linear-oblong pinnules (leafits), which are again cut into numerous minute, roundish segments. The upper surface is webby with slender branching hairs, which are much entangled and constitute a heavy tomentum of exceedingly delicate hairs having no evident articulations. When the frond is very old this webbiness partly wears off, while the colour of the scales of the lower surface gradually becomes deeper. The whole under-surface is densely clothed with imbricated, ferruginous (overlapping and rusty coloured) scales. The outer margin of the segments is so revolute as to make them appear almost pouch-like. The sori (spore masses), disposed a few to the margin of each pinnule, are entirely hidden beneath the scaly and woolly covering.—*Hooker*, *Species Filicum*, ii., p. 101, t. 107A. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Eaton*, *Ferns of North America*, ii., t. 74.

C. Lindigii—Lin-dig′-ĭ-i (Lindig's), *Mettenius*.

A stove species, from the Andes of Granada, with lanceolate (spear-shaped) fronds, 4in. to 8in. long and about 1in. broad, borne on densely-tufted, naked stalks 1in. to 4in. long and chestnut-brown in colour. The leaflets are sessile (stalkless) and cut down below to a narrow wing into oblong, blunt pinnules (leafits) of a thin, yet firm texture, and pale dull green on both surfaces. The sori (spore masses) are closely set, six to eight to the lowest pinnules.—*Hooker*, *Synopsis Filicum*, p. 475.

C. (Eucheilanthes) Matthewsii — Eu-cheil-anth′-es ; Mat-thews′-ĭ-i (Matthews's), *Kunze*.

This exceedingly pretty, greenhouse species, native of the Andes of Bolivia and Peru, produces from a stout, creeping rhizome, densely clothed with

narrow-spear-shaped, dark brown scales, its fronds, 4in. to 12in. long and 1in. to 2in. broad, which are borne on strong, erect, wiry, densely-downy stalks. The numerous leaflets are deltoid (in form of the Greek delta, Δ), much upcurled, incurved, and cut down to the rachis (stalk of the leafy portion) below into narrow-oblong, notched or pinnatifid leafits. The numerous sori (spore masses) are covered by roundish and slightly confluent involucres.—*Hooker, Species Filicum*, ii., p. 91.

C. (Aleuritopteris) mexicana—Al-eu-ri-top′-ter-is ; mex-ic-a′-na (from Mexico). Synonymous with *C. farinosa.*

C. (Eucheilanthes) micromera—Eu-cheil-anth′-ēs ; mi-crom′-er-a (having small parts). A variety of *C. microphylla.*

C. (Eucheilanthes) microphylla — Eu-cheil-anth′-ēs ; mi-croph-yl′-la (small-leaved), *Swartz.*

This very elegant, delicate-looking, greenhouse species is popularly known in North America as "Plumier's Lip Fern." Eaton, in his excellent work on "Ferns of North America," says (vol. ii., p. 84) that "on account of its having been discovered nearly two centuries ago by the Rev. Charles Plumier, a Franciscan, who visited the West Indies and published several magnificent folios on their botany, and was the first to notice this Fern, it is proper that the English name assigned to it should commemorate his discovery." It has a very extensive range of habitat as, according to Eaton, it is found on ancient shell-heaps, Stratton Island, near the mouth of the St. John's River, Florida ; also on the calcareous rocks of the Hot Springs of Arkansas ; and extends through Mexico and the West Indies southwards to Venezuela and Peru. Its fronds, produced from a slightly-creeping rhizome, and borne on slender, wiry, flexuose (bending) stalks 2in. to 6in. long, of a dark chestnut-brown colour and woolly below when young, are 3in. to 9in. long, 2in. to 3in. broad, spear-shaped and bi- or tripinnatifid (three or four times divided half-way to the midrib). The numerous leaflets are disposed in opposite pairs ; the lowest, 1in. to 2in. long, are divided into linear-oblong pinnules (leafits) of a somewhat leathery texture and cut down to the stalk below. Both surfaces are green and smooth. The roundish or elongated sori (spore masses) are covered with narrow involucres of a pale colour.—*Hooker, Species*

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Filicum, ii., p. 84, t. 98. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Eaton*, *Ferns of North America*, ii., t. 57.

This species is extremely variable in the form and composition of the frond, abundance or scantiness of the pubescence (down), and continuity of the involucres; consequently, several varieties are recorded, of which the following are the most distinct:

C. m. micromera—mi-crom′-er-a (having small parts), *Link*.

A well-known and pretty Fern, native of Venezuela, Brazil, and the West Indian Islands, with numerous spreading, closely-set leaflets and pinnules (leafits), egg-shaped or oblong, entire or nearly so, bearing continuous and confluent sori (spore masses) covered with a small indusium.—*Lowe*, *Ferns British and Exotic*, iv., t. 16.

C. m. Moritziana—Mor-itz-ĭ-a′-na (Moritz's), *Kunze*.

In this variety, which is of larger dimensions throughout than the type, the pinnules, often ½in. long, are cut down nearly to the rachis (stalk of the leafy portion) for the lower two-thirds into oblong segments.—*Hooker*, *Species Filicum*, ii., p. 85, t. 99B.

C. (Eucheilanthes) multifida—Eu-cheil-anth′-ēs; mul-tif′-id-a (much-cut), *Swartz*.

A very interesting, greenhouse species, of medium size, native of the Cape of Good Hope, whence it extends northward to Zambesi Land and St. Helena; according to Dr. Blume it is also found on the mountains of Java. Its comparatively massive fronds, 3in. to 12in. long and 2in. to 8in. broad, borne on strong, tufted, erect stalks 3in. to 9in. long, of a dark chestnut-brown colour, and slightly scaly towards the base, are deltoid (in shape of the Greek delta, Δ), and tri- or quadripinnatifid (three or four times divided half-way to the midrib). The lower leaflets, 2in. to 4in. long, are opposite, and divided again into numerous segments of a somewhat leathery texture, narrow-oblong in shape, deeply lobed, and having, when fertile, their margin much recurved. The small and roundish sori (spore masses) are terminal on the lobes, slightly confluent, and covered by an involucre of membranous or parchment-like nature.—*Hooker*, *Species Filicum*, ii., p. 90, t. 100. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 26.

C. (Physapteris) myriophylla—Phy-sap′-ter-is ; my-rĭ-oph-yl′-la (myriad-leaved), *Desvaux.*

This remarkably elegant species, popularly known as the "Lace Fern," is undoubtedly one of the prettiest of the whole genus. It is usually cultivated under the name of *C. elegans*, a name preferred by Mettenius, who says that the specimens of *C. elegans* and of *C. myriophylla*, both of Desvaux, are exactly alike. It certainly is the most extensively-grown species, and succeeds well either in the greenhouse or in the stove, being a native of Tropical America, especially on the west side, from Mexico southward to Peru and Chili. Eaton, in his excellent work, states that "it is found growing in crevices of rocks and on exposed rocks, mostly at elevations varying between 3000ft. and 5000ft., from Western Texas, through New Mexico, Arizona, and Nevada, to California, extending southwards to Peru and Chili." Its delicate-looking fronds, of a brittle nature, 4in. to 6in. long, 1½in. to 2in. broad, and borne on densely-tufted, wiry, erect stalks, 3in. to 6in. long, thickly clothed with pale, woolly down, are somewhat spear-shaped and tri- or quadripinnatifid (three or four times divided half-way to the midrib). The lower leaflets, about 1in. long, ½in. broad, and broadly spear-shaped, are cut down to the rachis (stalk of the leafy portion) on both sides into numerous narrow-oblong leafits, which are again slightly branched at the base, and further divided into very small, roundish, bead-like segments, the margin of which is so much incurved as to make these organs appear pouch- or pocket-shaped. The upper surface of the frond is of a bright pale green, and slightly hairy, while the lower one is distinctly matted and scaly. The abundant sori (spore masses) are disposed all round the margin of the bead-like segments, and are slightly confluent.—*Hooker*, *Species Filicum*, ii., p. 100, t. 105. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Eaton*, *Ferns of North America*, ii., t. 79. *Lowe*, *Ferns British and Exotic*, iv., t. 20.

Eaton says that the scaly-fronded species, of which this is one, and five of which constitute the greatest part of the sub-genus *Physapteris*, may be distinguished by the scales, which, in *C. Fendleri*, are entire or very sparingly ciliate (hairy) at the base. In *C. myriophylla* they are ciliate with comparatively few long and slender hairs, which are much more abundant in *C. Clevelandi*. The scales in *C. scariosa* cover both surfaces, and are very

large, spear-shaped, erosely ciliate (as if gnawed), and toothed; while in *C. Lindheimeri* they are mostly replaced by entangled tomentum.

C. Lindheimeri is tomentose (woolly) on the upper surface of its fronds; those of *C. myriophylla* are sometimes sparingly hairy on their upper surface, but oftener smooth; but both *C. Clevelandi* and *C. Fendleri* have their upper surface always smooth, though in these species, as also in *C. myriophylla*, the ciliæ (somewhat stiffish hairs like eye-lashes) of the scales are often curled over the upper surface of the pinnules so as to simulate pubescence there.

C. (Eucheilanthes) mysurensis — Eu-cheil-anth′-ēs; my-su-ren′-sis (Mysuran), *Wallich.*

A stove species, also known as *C. chusana*, native of Tropical Hindostan, found also in Ceylon, West China (at Canton, Chusan), and in Japan, with fronds 3in. to 12in. long, 1½in. to 3in. broad, borne on very short, wiry, and densely-tufted stalks of a dark, chestnut-brown colour, and scaly when young. The numerous leaflets, 1in. to 1½in. long and opposite, are cut down to the rachis (stalk of the leafy portion) into numerous narrow-oblong pinnules (leafits) of a thin, papery texture when young, but becoming somewhat leathery with age. The small, roundish sori (spore masses) are sometimes distinct and sometimes slightly confluent.—*Hooker*, *Species Filicum*, ii., p. 94, t. 100A. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Beddome*, *Ferns of Southern India*, t. 190.

C. nitidula—nit-id′-ul-a (bright). The plant described under this name in Beddome's "Ferns of British India," t. 222, is synonymous with *Pellæa nitidula* of Baker.

C. odora—od-o′-ra (sweet). Synonymous with *C. fragrans.*

C. (Adiantopsis) pedata — Ad-ĭ-ant-op′-sis; ped-a′-ta (having feet), *A. Brongniart.*

A stove species, of somewhat singular shape, native of Jamaica, with fronds about 6in. each way, divided in threes, the central portion triangular, with numerous narrow-spear-shaped pinnules (leafits) growing gradually larger downwards, the lateral portions regularly spear-shaped, while the lowest pinnules on each side, 1in. to 2in. long, are distinctly pinnate, being divided

into segments ¼in. long, oblong, narrowed suddenly to a point and auricled at the base above. Their texture is somewhat leathery, and the small, roundish sori (spore masses), which are abundantly produced, are disposed round both edges of the segments.—*Hooker*, *Species Filicum*, ii., p. 73, t. 92A.

C. persica—per′-sic-a (Persian). This is identical with *C. Szovitzii.*

C. Preissiana—Preis-sĭ-a′-na (Preiss's). A synonym of *C. Sieberi.*

C. (Adiantopsis) pteroides—Ad-ĭ-ant-op′-sis ; pter-ŏ-i′-dēs (Pteris-like), *Swartz.*

This curious and pretty, greenhouse species, of somewhat robust habit, is a native of the Cape of Good Hope, where it has been gathered up to 3000ft. elevation, also of the Island of Java, where it is found at the summit of Mount Gede. Its singular fronds, 1ft. to 1½ft. long, 6in. to 9in. broad, borne on strong, erect, naked stalks 6in. to 12in. long and of a dark chestnut-brown colour, are deltoid (in shape of the Greek delta, Δ) ; their lower part is tripinnate (three times divided to the midrib), being provided with several opposite pairs of wiry branches growing gradually larger downwards, the lowest often again branched ; their upper part is simply pinnate (only once divided to the midrib) ; the segments are sessile (stalkless), oblong, and entire, and are broadly rounded at both ends. The texture is somewhat leathery ; the copious small and roundish sori (spore masses) form a broad, marginal, reddish-brown belt round the edges of the segments, and are covered by a brown, contiguous indusium of membranous (parchment-like) texture. This species differs in so many respects from all others comprised in the genus *Cheilanthes* that it has been called *Adiantum* by Linnæus, *Cassebeera* by Presl, and *Pteris* by Houttuyn. However, as the plant has the true involucres of *Cheilanthes*, Sir William Hooker has very properly placed it in that genus.—*Hooker*, *Species Filicum*, ii., p. 80, t. 101. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 21.

C. (Eucheilanthes) pulchella — Eu-cheil-anth′-ēs ; pul-chel′-la (neat), *Bory.*

A distinct and pretty, greenhouse species, native of Madeira and the Canaries, with fronds 3in. to 12in. long and 2in. to 4in. broad, borne on densely-tufted, strong, erect stalks 3in. to 9in. long, of a dark chestnut-brown

colour. These fronds are tripinnate (three times divided to the midrib), and their lower leaflets, 2in. to 3in. long and opposite, are divided into spear-shaped pinnules (leafits) of a somewhat leathery texture, and cut down to the rachis (stalk of the leafy portion) into numerous narrow-oblong segments, around the edges of which the copious roundish sori (spore masses) are regularly disposed.—*Hooker*, *Species Filicum*, ii., p. 109, t. 94A.

C. (Adiantopsis) radiata—Ad-ĭ-ant-op′-sis ; rad-ĭ-a′-ta (having rayed leaflets), *R. Brown.*

This pretty little, stove Fern (see Coloured Plate) was for a long time considered a species of *Adiantum*, to which, by its general appearance, it seems related much more than it does to any of the plants belonging to this genus. It is a native of Tropical America, and has a very extensive range of habitat, for it has been imported from Mexico, the West Indies, Jamaica, St. Domingo, Martinique, Caraccas, and frequently from Brazil. In Mexico, this interesting species is found growing in shady places in woods, from the east coast to an elevation of 4,500ft. Its fronds are of a peculiar shape, their pinnæ (leaflets), usually six to nine to each frond, all starting from a common central point like the spokes of a wheel, with a whorl of bract-like segments at the axis ; they are borne at the extremity of strong, erect, wiry stalks, 1ft. to 1½ft. long, and of a blackish, glossy, polished nature. The longest of the leaflets are from 6in. to 9in. long, about 1in. broad, and furnished with numerous pinnules (leafits), about ½in. long, unequal-sided, truncate at the base below, and auricled (eared) at the base above. The small and very numerous sori (spore masses) are very conspicuously placed along both margins of the entire pinnules, often crowded, and always covered with a reniform (kidney-shaped) indusium of a bright brown colour.—*Hooker*, *Species Filicum*, ii., p. 72, t. 91A. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 14.

C. (Physapteris) Regnelliana—Phy-sap′-ter-is ; Reg-nel-lĭ-a′-na (Regnell's), *Mettenius.*

A greenhouse species, of small dimensions, native of Brazil. Its fronds, 2in. to 3in. long, rather more than 1in. broad, and borne on erect, wiry, polished stalks 2in. long and of a dark chestnut-brown colour, are spear-

shaped and bipinnate (twice cut down to the midrib). The numerous pinnæ (leaflets), of a somewhat leathery texture, are closely set, spreading at right angles from the rachis (stalk of the leafy portion), and furnished on each side with eight to ten small, bead-like, sessile pinnules (stalkless leafits), which are hardly more than half-a-line each way, and rolled up like a ball. The spore masses are completely hidden.—*Hooker*, *Synopsis Filicum*, p. 138.

C. (Adiantopsis) regularis — Ad-ĭ-ant-op′-sis ; reg-ul-a′-ris (regular), *Mettenius.*

A greenhouse, Brazilian species, with fronds 6in. to 8in. long, borne on stalks of the same length, densely clothed with rusty-brown hairs. The pinnæ (leaflets) are divided into distinctly-stalked pinnules (leafits), wedge-shaped at the base below, truncate or auricled (eared) above, and slightly notched. The abundant roundish sori (spore masses) are disposed at intervals round the edge of the pinnules. — *Hooker*, *Synopsis Filicum*, p. 131.

Fig. 11. Cheilanthes rufa (⅛ nat. size).

C. (Aleuritopteris) rufa — Al-eu-ri-top′-ter-is ; ru′-fa (reddish), *Desvaux.*

This handsome and distinct, stove species, of medium growth, is the only tomentose (woolly) plant known belonging to the group *Aleuritopteris.* It is a native of North Hindostan, where it is found growing up to 4000ft. elevation, and Beddome gives Burmah, Nepaul, Mishmee Mergui, Khasya, and Simla, as localities where it has also been collected. Its fronds, 6in. to 9in. long and 2in. to 3in. broad, are borne on stiff, upright stalks, densely clothed with short hairs of a woolly nature and of a rusty-brown colour. The leaflets, which are opposite, are oblong in shape, and their pinnules or subdivisions are largest on the lower side, where they are frequently ½in. long. The texture is soft and papery ; the upper surface is covered with short,

woolly hairs, while the under-side, as is the case with all other known plants belonging to the same group, is more or less coated with white powder. The small, roundish sori (spore masses) are abundantly produced and disposed along the margin of the pinnules ; they are covered with brown, ciliated involucres. Fig. 11 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker*, *Species Filicum*, ii., p. 79, t. 99A. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Beddome*, *Ferns of British India*, t. 144.

C. rufescens—ru-fes′-cens (reddish). A name applied in Continental gardens to *C. cuneata*.

C. (Physapteris) scariosa — Phy-sap′-ter-is ; scar-ĭ-o′-sa (shrivelled, dry), *Kaulfuss*.

A stove species, native of the Andes of Peru, with fronds 6in. to 8in. long, 1in. broad, narrowly spear-shaped, and bipinnate (twice divided to the midrib), borne on densely-tufted stalks only 1in. to 2in. long and densely covered with large scales of a whitish-brown colour. The numerous leaflets, linear-oblong and ½in. to ¾in. long, are cut down to the rachis (stalk of the leafy portion) into pinnules (leafits) of similar shape, both surfaces of which are densely coated with spear-shaped, pointed scales, bright brown in the centre and silvery-white towards their hairy margin. The edge of the segments, on which the copious roundish sori (spore masses) are disposed, is conspicuously incurved.—*Hooker*, *Species Filicum*, ii., pp. 99-104A.

C. (Adiantopsis) Schimperi—Ad-ĭ-ant-op′-sis ; Schim-pe′-ri (Schimper's), *Hooker*.

A greenhouse species, native of Abyssinia, with fronds 3in. to 4in. each way, borne on wiry, erect, glossy stalks 3in. to 6in. long and of a chestnut-brown colour. The lower leaflets are much the largest, and are divided into narrow ultimate segments of a somewhat leathery texture, sometimes entire, at other times distinctly toothed. The numerous small sori (spore masses) are evenly disposed along both margins of the segments. In general habit this species resembles the better-known *C. tenuifolia* and *Hypolepis californica*.—*Hooker*, *Species Filicum*, ii. p. 70.

C. (Adiantopsis) Seemanni—Ad-ĭ-ant-op′-sis ; See-man′-ni (Seemann's), *Hooker.*

A very pretty, stove Fern, native of the Sierra Madre, North-West Mexico, but possibly only a form of *C. microphylla*, from which it differs only by its distinct involucres.—*Hooker*, *Species Filicum*, ii., p. 85, t. 97A.

C. (Eucheilanthes) Sieberi—Eu-cheil-anth′-ēs ; Sie′-ber-i (Sieber's), *Kunze.*

This very elegant, delicate-looking, greenhouse species, also known as *C. Preissiana*, is a native of Australia, New Zealand, New Caledonia, and the Isle of Pines. Its light-coloured fronds, 3in. to 6in. long and 1in. to 1½in. broad, are produced from a creeping rhizome (prostrate stem) and borne on wiry, polished stalks 3in. to 6in. long and of a dark chestnut-brown colour. The spear-shaped leaflets, 1in. to 1½in. long, ½in. broad, are disposed in pairs and opposite ; the lowest are often distant and divided into oblong leafits cut down to the rachis (stalk of the leafy portion) in the lower part. The sori (spore masses), so small as to be reduced to mere points, are covered with small, narrow, pale brown involucres, usually separate, but sometimes continuous along the edge of the segments.—*Hooker*, *Species Filicum*, ii., p. 83, t. 97B.—*Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 22.

C. (Physapteris) speciosissima—Phy-sap′-ter-is ; spec-ĭ-o-sis′-sim-a (most beautiful), *A. Brongniart.*

This robust-growing, greenhouse species, native of Guatemala and Mexico, where it occurs at an elevation of 12,000ft., is the same plant as the one named *Plecosorus mexicanus* by Fée, who considered it distinct from *Cheilanthes* through its fructification not being quite marginal. Its ample, yet elegantly-cut fronds, 1ft. to 2ft. long, 4in. to 6in. broad, spear-shaped and tripinnate (three times divided to the midrib), are borne on stout, erect stalks 3in. to 6in. long, densely clothed with large, spear-shaped scales, 1½in. long by ¼in. broad, of a rusty-brown colour. The numerous leaflets, 2in. to 3in. long, spreading and spear-shaped, are divided into close, linear-oblong pinnules (leafits) of a somewhat leathery texture and cut down to the rachis (stalk of the leafy portion) into numerous small, beaded segments.

The upper surface of the whole frond is nearly naked, but its under-side is very woolly. The sori (spore masses), which are not situated quite on the margin of the segments, are covered by their edge, which is of a parchment-like texture, toothed, and so much incurved as to form a nearly continuous involucre.—*Hooker, Species Filicum*, ii., p. 103.

C. spectabilis—spec-ta′-bil-is (showy). Synonymous with *C. chlorophylla.*

C. squamosa—squa-mo′-sa (scaly). The plant usually found in gardens under this name is the same as *Nothochlæna squamosa* of Fée.

C. suaveolens—sua′-vĕ-ol-ens (sweet-smelling). A synonym for *C. fragrans.*

C. (Eucheilanthes) subvillosa—Eu-cheil-anth′-ēs ; sub-vil-lo′-sa (somewhat villous, or furnished with long weak hairs), *Hooker.*

A greenhouse species, of medium growth, which, like *C. Dalhousiæ*, differs from all the rest of the sub-genus in its broader segments and herbaceous (soft) texture. It is a native of the Pahur Valley and Simla Himalayas. The fronds, 6in. to 12in. long, 2in. to 3in. broad, and borne on rather brittle, polished, densely-tufted stalks 2in. to 4in. long, of a bright chestnut-brown colour and clothed with spear-shaped scales below, are spear-shaped and tripinnatifid (three times divided half-way to the midrib). Their leaflets, which are disposed in numerous pairs, the lower ones distant, are 1½in. long, more than 1in. broad, and divided into leafits of a herbaceous (soft, papery) texture ; those on the lower side the largest, sometimes 1in. long, oblong-spear-shaped, and cut down to the rachis (stalk of the leafy portion) into oblong lobes. The copious small sori (spore masses) are evenly disposed around the margin of the lobes, and are covered by greenish involucres.—*Hooker, Species Filicum*, ii., p. 87, t. 98B. *Beddome, Ferns of British India*, t. 142.

C. (Physapteris) Szovitzii — Phy-sap′-ter-is ; Szo-vitz′-ĭ-i (Szovitz's), *Fischer and Meyer.*

This greenhouse species, closely related to *C. lanuginosa*, from which it only differs by having distinct scales mixed with the tomentum (woolly covering) of the stalks and rachis, is a native of Asia Minor and Persia, extending southward to North Hindostan, and ascending in the Himalayas

8500ft.; it is also found in Italy and Dalmatia. Its delicate fronds, 3in. to 6in. long and a little more than 1in. broad, are bipinnatifid (twice divided half-way to the midrib), and furnished with leaflets somewhat triangular in shape and opposite. Their pinnules are cut down into small, roundish, beaded segments. The upper surface of the fronds is green and slightly hairy; while their lower surface is densely matted with a coat of pale brown, woolly hairs, and the margin of the segments is much incurved. The sori (spore masses), small and abundant, are disposed on the margin of the segments. *C. persica* of Mettenius and *Nothochlæna persica* of Bory are synonymous with this species. Fig. 12 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author. — *Hooker, Species Filicum*, ii., p. 98, t. 98. *Beddome, Ferns of British India*, t. 145.

Fig. 12. Cheilanthes Szovitzii (½ nat. size).

C. (Eucheilanthes) tenuifolia—ten-ŭ-if-ol′-ĭ-a (slender-leaved), *Swartz.*

This pretty, delicate-looking, greenhouse species has a remarkably wide range of habitat, for while it is reported as found in New Zealand, Australia, and southward to Tasmania, it is also known in the Malayan Peninsula and Islands, in South-East China, in the Polynesian Islands, and in the Sub-Tropical region of the Himalayas; and Beddome states that it is a common Fern in dry localities all over the Madras Presidency, where it is not found at any great elevation. Its fronds, 4in. to 8in. long, 3in. to 4in. broad, and tripinnatifid (three times divided half-way to the midrib), are borne on wiry, flexuose (bending), naked stalks 4in. to 8in. long, of a dark chestnut-brown colour and slightly scaly at their base. The numerous leaflets are disposed in opposite pairs, the lowest 2in. to 4in. long, 1in. to 2in. broad, and divided into pinnules (leafits) which are largest on the

lowest side and cut down to the rachis (stalk of the leafy portion) into oblong, entire or pinnatifid segments. The texture is somewhat leathery, and both surfaces are light green and naked. The circular and eventually confluent sori (spore masses) are covered by narrow, brownish involucres, which are more or less toothed.—*Hooker*, *Species Filicum*, ii., p. 82, t. 87c. *Nicholson*, *Dictionary of Gardening*, i., p. 308. *Lowe*, *Ferns British and Exotic*, iv., t. 19. *Beddome*, *Ferns of Southern India*, t. 188.

C. (Eucheilanthes) tenuis—Eu-cheil-anth′-ēs ; ten′-ŭ-is (slender), *Presl.*

A pretty little, stove species, native of Mexico, with fronds averaging about 1ft. in length, including the stalk, which is produced from a creeping rhizome (prostrate stem) ; they are somewhat spear-shaped and tripinnate (three times divided to the midrib). The leaflets, oblong in shape, are divided again into minute and somewhat circular segments with a wedge-shaped base, dented, reflexed, and concave ; they are covered on both sides with a woolly substance of a rusty-brown colour. The sori (spore masses) are disposed in a single row and are in some degree hidden in the axis of the reflexed margin of each segment, where they are covered by a narrow and continuous indusium.—*Lowe*, *Ferns British and Exotic*, iv., t. 23.

C. (Physapteris) tomentosa — Phy-sap′-ter-is ; to-men-to′-sa (downy), *Link.*

This delicate, greenhouse species, which is also known as *C. Bradburii*, is very woolly in appearance and differs considerably from most other known species. It is essentially a native of North America, where it is known as the "Webby Lip Fern." Eaton, in his "Ferns of North America," says : "It is decidedly the largest plant among all our North American species of *Cheilanthes*, some of the tallest specimens measuring nearly 2ft. in total length. It is found growing in dense masses on sandstone rocks along the French Broad River, in North Carolina and Eastern Tennessee, in Missouri and Texas." Under cultivation, its fronds, usually 6in. to 12in. long and 2in. to 3in. broad, are borne on strong, erect stalks 4in. to 6in. long, densely matted with pale brown, woolly down ; they are oblong-spear-shaped and tripinnatifid (three times divided half-way to the midrib). The leaflets, 1in. to 1½in. long and ¾in. broad, are opposite, and divided into

pinnules (leafits) that are again cut down to the rachis (stalk of the leafy portion) into numerous small, oblong, bead-like segments of a somewhat leathery texture. The upper surface of the fronds is of a peculiar greyish-green colour and pubescent, while the lower is densely matted, and the margin of the segments is incurved. The sori (spore masses) are not copious by any means, there being only a few of them to each segment, and they are covered by a pale involucre of parchment-like texture.—*Hooker*, *Species Filicum*, ii., p. 97, t. 109B. *Nicholson*, *Dictionary of Gardening*, i., p. 309. *Eaton*, *Ferns of North America*, i., t. 45. *Lowe*, *Ferns British and Exotic*, i., t. 15B.

C. (Eucheilanthes) varians — Eu-cheil-anth′-ēs ; var′-ĭ-ans (variable), *Hooker.*

A greenhouse species, of little decorative value and dwarf habit, native of the Himalayas, where it grows at 2000ft. to 3000ft. elevation.—*Hooker*, *Synopsis Filicum*, p. 136.

C. (Eucheilanthes) vestita — Eu-cheil-anth′-ēs ; ves-ti′-ta (clothed), *Swartz.*

This pretty, greenhouse species, which Michaux first named and described under the name of *Nephrodium lanosum*, is a native of North America, where, according to Eaton, it is popularly known as the "Clothed Lip Fern," and is found growing wild in clefts and on ledges of rocks from the Island of New York westward to Illinois, Missouri, and Kansas, and southward to the Carolinas and Georgia. Its fronds, 4in. to 8in. long and 1½in. to 2in. broad, are produced from a creeping rootstock that is much matted and entangled, sometimes forming large tufts, and are borne on wiry, polished stalks 2in. to 4in. long, of a chestnut-brown colour and slightly downy. Their pinnæ (leaflets), which are opposite and about ¾in. long, are cut down to the rachis (stalk of the leafy portion) into several oblong pinnules (leafits) on each side, which in their turn are again cut down nearly or quite to the stalk below. The whole frond is of a somewhat leathery texture, with the upper surface nearly naked and the lower one only slightly hairy, not densely matted. The abundant sori (spore masses) are roundish, and disposed on the margin of the segments, at first distinctly separate, but eventually becoming confluent.

—*Hooker, Synopsis Filicum*, p. 134. *Nicholson, Dictionary of Gardening*, i., p. 309. *Eaton, Ferns of North America*, i., t. 2. *Lowe, Ferns British and Exotic*, i., t. 16A.

C. (Eucheilanthes) viscida — Eu-cheil-anth′-ēs ; vis′-cid-a (sticky), *Davenport.*

A very elegant little, greenhouse species, native of North America, where, according to Eaton, it is known as the "Sticky Lip Fern," and where, according to the same authority, it is found growing wild at the White Water Cañon in the Colorado Desert, Arizona, and at Downieville Buttes, California ; also on the eastern slope of the Sierra of California, near San Gorgorio Pass. Its fronds, 3in. to 5in. long, narrow-oblong in outline, and bipinnate (twice divided to the midrib), are borne on wiry, dark brown, tufted stalks 3in. to 5in. long, chaffy at the base, but shining in their upper part ; they are of a herbaceous (soft, papery) texture, minutely glandular, everywhere viscid (sticky), and furnished with from four to six pairs of nearly sessile (almost stalkless) leaflets ¼in. long, divided into conspicuously-toothed segments. The sori (spore masses) are disposed from one to three to each segment, where they are covered by curiously-recurved, minute, herbaceous teeth.—*Eaton, Ferns of North America*, i., t. 12.

C. (Eucheilanthes) viscosa — Eu-cheil-anth′-ēs ; vis-co′-sa (clammy), *Kaulfuss.*

This very distinct, Central American species, which is generally grown in a stove, but which will be found to thrive admirably under greenhouse treatment, is a native of Mexico and Venezuela. It is easily distinguished from its allies by the triangular outline of its fronds, which are 4in. to 6in. each way, tri- or quadripinnatifid (three or four times divided half-way to the midrib), and borne on strong, upright, wiry stalks 4in. to 6in. long, of a chestnut-brown colour and densely hairy. These fronds, which are pale green in colour and entirely covered with minute, viscid (sticky), glandular hairs, are abundantly produced from a short-creeping rhizome (prostrate stem). The pinnæ (leaflets) are disposed in pairs, the lowest much the largest, and divided into spear-shaped pinnules (leafits) that are sometimes 2in. long, with narrow-linear segments which are again cut down

to the rachis (stalk of the leafy portion) into small, bead-like divisions. The abundant sori (spore masses) form a continuous margin along the fertile segments.—*Hooker*, *Species Filicum*, ii., p. 105, t. 93B. *Nicholson*, *Dictionary of Gardening*, i., p. 309. *Lowe*, *Ferns British and Exotic*, iv., t. 25.

C. (Eucheilanthes) Wrightii—Eu-cheil-anth′-ēs ; Wright′-ĭ-i (Wright's), *Hooker*.

This small-growing and pretty little Fern, which by Hooker is said to be "somewhat allied in its fructification to the East Indian *C. varians*, though quite distinct," is, according to Eaton, one of the rarest species of *Cheilanthes* found in North America, where it is known as "Wright's Lip Fern." It is reported as growing wild in the crevices of rocks between Western Texas and New Mexico, Arizona ; also on the Chiricahua Mountains, near Camp Grant, and in the Sanoita Valley. In general habit it somewhat resembles some small forms of *C. tenuifolia*. Its fronds, only 2in. to 3in. long and 1½in. broad, broadly spear-shaped and tripinnatifid (three times divided half-way to the midrib), are borne on strong, wiry stalks 2in. to 4in. long, of a chestnut-brown colour, and finely scaly when young. The pinnæ (leaflets), disposed in several opposite pairs, are triangular, and divided into pinnules (leafits) that are cut about half-way down into oblong, pointed, somewhat leathery lobes. Both surfaces are naked. The abundant roundish spore masses are disposed all round the fertile segments, being almost entirely covered by the much-incurved margin.—*Hooker*, *Species Filicum*, ii., p. 82, t. 87G. *Nicholson*, *Dictionary of Gardening*, i., p. 309. *Eaton*, *Ferns of North America*, ii., t. 57.

CHEILOPLECTON—Cheil-op-lec′-ton. *See* **Pellæa.**
CHEIROGLOSSA—Cheir-og-lōs′-sa. *See* **Ophioglossum.**
CHRYSODIUM—Chry-so′-dĭ-um. *See* **Acrostichum.**
CIBOTIUM—Cib-o′-tĭ-um. *See* **Dicksonia.**
CINCINALIS—Cin-cin-a′-lis. *See* **Nothochlæna.**
CIONIDIUM—Ci-o-nid′-ĭ-um. *See* **Deparia.**
COLYSIS—Co-ly′-sis. *See* **Polypodium.**
COPTOPHYLLUM—Copt-oph-yl′-lum. *See* **Anemia.**
CRASPEDARIA—Cras-ped-a′-rĭ-a. *See* **Polypodium.**

CHAPTER VII.

CRYPTOGRAMME, *R. Brown.*

(Cryp-tog-ram′-mĕ.)

Mountain Parsley Fern, or Rock-Brake.

THIS genus, which in Hooker and Baker's "Synopsis Filicum" is given as Genus 29, is closely related to *Pellæa*, from which it differs principally through the dimorphic nature of the fronds of the few plants of which it is composed—fertile and barren ones, totally different in appearance and in conformation, being invariably produced by the same root. The name *Cryptogramme*, which is derived from *crypto*, hidden, and *gramme*, writing, was given to it by R. Brown, in allusion to the concealed sori (spore masses), which are terminal on the veins, at first separate, sub-globose (nearly spherical), afterwards confluent and arranged in lines hidden beneath the continuous involucre (covering), which is formed of the changed margin of the frond, rolled over them until they arrive at maturity. The present name has superseded that of *Allosorus*, which, at the commencement of the present century, Bernhardi gave to a genus formed with eight or nine species of *Cheilanthes*, one *Pellæa*, and one *Pteris*, but which is at present restricted to a section of the genus *Pellæa* only.

It is worthy of notice that the genus *Cryptogramme* is composed of a solitary, but distinct and very pretty, species, of British or European origin, and of only two varieties—one from Northern India, where it is found growing at from 9000ft. to 13,000ft. elevation, and another, a North American

form, which is said to grow at an altitude varying between 8000ft. and 10,000ft. on the Sierra of California. As may be seen by comparing our illustrations (Figs. 13 and 14), the general appearance of *C. crispa acrostichoides* would seem sufficiently distinct to warrant the assumption of its being an independent species. The distinctions are, however, more apparent than real, for Hooker, in "Species Filicum," ii., p. 131, says that some of the Scottish specimens of *C. crispa* in his collection are almost identical with those from North America, and that he has some from the United States and from British Columbia which quite agree with the common European form. The two plants are, in fact, so nearly allied that Hooker and Milde have considered the American as only a variety of the European species.

The Mountain Parsley Fern, so named on account of its great resemblance to the typical Parsley (and not, as people generally imagine, to the curled forms almost exclusively cultivated nowadays), is undoubtedly one of the prettiest of all our native Ferns. It is also one of the very few which, under cultivation, have retained their characters perfectly constant; for, notwithstanding the enormous quantities grown under various conditions, no deviation from the species worthy of record has as yet been noticed in this country. It remains, as it was many years ago, simply the Mountain Parsley Fern. The plant, which seldom exceeds 5in. to 6in. in height, appears particularly fond of a cold climate; and Correvon, in his "Fougères rustiques," p. 83, says that it is the Mountain Fern par excellence, as it is rare that, except in the Polar regions, it is met with in any other situation than on the mountains. In the Haute-Savoie, as also on Mont Blanc and on the Buet, this Fern is so abundant as to form, so to speak, in certain places the basis of the vegetation. It is also found on the Swiss Alps, while in Germany it is plentiful on the Harz, the Riesengebirge, and in the Black Forest. In France it occurs on the Vosges, the Cevennes, and the Pyrenees.

C. crispa appears to have been unknown to Gerarde and to his editor, Johnson, for we cannot find any mention of it as a British plant until 1696, when Ray, in the second edition of his "Synopsis Methodica Stirpium Britannicarum," describes it as having been found in Westmoreland and other places by Mr. James Sutherland, the first Curator of the Edinburgh Botanical Gardens. Ray calls it, as it was named by its first describer, Schwenkfeld, *Adiantum album crispum alpinum*, or Curled Alpine White Maidenhair; and

Linnæus named it at one time *Osmunda* and at another time *Pteris crispa*. The Mountain Parsley Fern is essentially a granite-loving—or, at any rate, a stone-loving—plant, sometimes entirely covering either rocks or walls of old ruins, as is the case in Luxemburg, on the Schainschloss, near Rambruch. In its British wilds it is found growing among loose stones or in crevices of rocks, and grand masses of it have from time to time been gathered in an old quarry in Perthshire, as also in Wales, on Cader Idris, in Merionethshire, and on Snowdon, in Carnarvonshire. Mr. E. J. Lowe, in his excellent work, "Our Native Ferns," vol. i., p. 58, says that when seen in all the luxuriance of wildness, growing amongst the shapeless masses of a profusion of loose stones on the sides of a mountain, it is not likely to be readily forgotten. His description of this really charming little plant in its wild habitats is so vivid that we cannot do better than reproduce the most interesting portion of it: "When the *Allosorus crispus*," says Mr. Lowe, "grows luxuriantly, the mountain-sides that are taken possession of by it resemble at a distance verdant meadows; and it is only on a near approach that this vivid green resolves itself into the many-fronded plants of the Rock-Brakes. In the English Lakes the mountain-sides of Lothrigg Fell and Fairfield are instances of this; and the former, being easily reached from Ambleside, will well repay the tourist making its steep but not lengthy ascent. Lothrigg Fell is soon reached from the principal inns of Ambleside, the ascent being made on the Windermere side, not far from the lovely-situated church of Brathay. Passing through a steep field of *Allosorus crispus*, the summit is gained, and on the one side there is the Lily Tarn, spoken of by Wordsworth, backed in the distance by Helvellyn, Fairfield, and Langdale Pike; whilst on the other, overlooking the head of the lake, there is a magnificent and never-to-be-forgotten view down Windermere, especially from the stone-piled erection left by the Ordnance Survey. Here the artist has a vast scope for his pencil, whilst the poet fails in words expressive enough in his endeavour to describe what he sees before him; painting in the language of inspiration, or delineating on canvas such scenes as these, are indeed tasks of no ordinary kind, and each must feel dissatisfied with his labours when he sees they fall short of the reality."

In Scotland *C. crispa* is widely spread, being found in almost every county. In Lancashire it is plentiful on the moor behind the town of

Lancaster, and Mr. Monkman remarks that it grows in great profusion at the Lancaster station, setting the smoke from the silk mills at defiance. In that locality it flourishes at nearly the sea-level, whilst in the Highlands of Scotland it is found at an elevation of 3450ft.

The Mountain Parsley Fern is essentially a deciduous plant, losing its fronds about the end of October and starting into growth again about the beginning of May. Its fertile fronds, considerably longer than the others and produced as a second crop of foliage later in the season, are greatly appreciated for bouquets and button-holes. Their spores ripen and scatter themselves, in their native state, about September, after which the fronds soon die down, the barren ones remaining on the plants rather longer than the others.

Culture.

Although usually found growing wild in exposed situations, the Mountain Parsley Fern delights in a cool, moist, and shady spot, and is especially adapted for a quiet nook in a rockery, where it should be planted in a well-drained place and in a mixture of loam and peat in about equal parts, with the addition of bricks broken into small pieces; but care should be taken that the compost is free from lime, which is highly injurious to its very minute, fibrous rootlets. It may be propagated by seedlings, but this is a slow and tedious process; the more so that it is readily increased by the division of the crowns in the spring months, just before growth commences. This little gem also grows luxuriantly in a cold frame, or for two or three years in the greenhouse, or under the shade of vines, where, however, it seldom lasts any longer. The plants should always be well established in pots before being turned out into the border or on the rockery.

C. crispa—cris′-pa (curled), *R. Brown.*

A hardy species, native of Arctic Europe to Lake Baikal, Mount Olympus, Bithynia, Etruria, and Sierra Nevada, with fronds of a pale, delicate green colour, abundantly produced from a densely-tufted rootstock, which lies horizontally just beneath the surface of the soil and produces a great quantity of very minute, hair-like, fibrous rootlets. These fronds, of a herbaceous (soft, papery) texture and 2in. to 6in. long, are borne on straw-coloured,

polished stalks of the same length and slightly scaly towards the base; they are oblong in shape, three or four times divided half-way to the midrib (Fig. 13), and naked on both surfaces. In the barren fronds, the ultimate segments are somewhat wedge-shaped and deeply pinnatifid, while those of the fertile fronds are pod-shaped. The sori (spore masses) are hidden beneath the reflexed margins of the segments, which nearly join at the midrib, eventually becoming confluent.—*Hooker, Synopsis Filicum*, p. 144. *Nicholson, Dictionary of Gardening*, i., p. 403. *Lowe, Our Native Ferns*, i., t. 10.

Fig. 13. Cryptogramme crispa (½ nat. size).

C. c. acrostichoides—ac-ros′-tich-ŏ-i′-dēs (Acrostichum-like), *R. Brown.*

This exceedingly pretty variety (Fig. 14), perfectly hardy in the South and West of England, is a native of North America, where it is commonly known under the popular name of "American Rock-Brake." According to Eaton, it was first collected by Menzies at Nutka Sound. It is found growing in dense tufts and patches among rocks and in their crevices from Arctic America southward to Lake Superior, Colorado, Alaska, and the Sierra of California, where Professor Brewer reports finding it at from 8000ft. to 10,000ft. above the level of the sea. It is of larger and stronger habit than our species, the barren fronds having their rachis (stalk of the leafy portion) narrowly winged, and their segments of thicker texture and not so deeply cut. The fertile fronds are twice as long as the others, and are

Fig. 14. Cryptogramme crispa acrostichoides (½ nat. size).

provided with fewer and more distant, longer, narrow and distinctly-stalked segments; these are pod-like, and their edges are so far recurved as to meet at the midvein or even to overlap, forming a herbaceous (papery) involucre which spreads when mature.—*Hooker*, *Synopsis Filicum*, p. 144. *Nicholson*, *Dictionary of Gardening*, i., p. 403. *Eaton*, *Ferns of North America*, ii., t. 59.

C. c. Brunoniana—Bru-no′-nĭ-a′-na (Brown's), *Wallich.*

A form of very similar habit to the European species, but with fertile segments oblong, about ¼in. long, and with the involucre spreading in the mature plant. The whole plant is of about the same dimensions as the common Mountain Parsley Fern, from which, however, it is thoroughly distinct through its having a well-marked space left free from the fructification to the midvein in the centre. It is a native of Northern India, where it is widely distributed, being found, according to Beddome, in the Shayak Valley at 9000ft. elevation, above Simla, Sikkim-Himalaya, at Kumaon, &c., where it is met with at altitudes varying between 11,000ft. and 13,000ft.—*Hooker*, *Synopsis Filicum*, p. 144. *Nicholson*, *Dictionary of Gardening*, i., p. 403. *Beddome*, *Ferns of British India*, t. 164.

CHAPTER VIII.

CYATHEA, *J. Smith.*

(Cÿ-ath′-ĕ-a.)

ABOUT eighty species are embraced in this genus, which is an important division of the tribe *Cyatheæ*, and which derives its name from *kyatheion*, a little cup, in reference to the appearance of the spores on the back of the fronds. It forms Genus 4 in Hooker and Baker's "Synopsis Filicum," and is composed entirely of plants from tropical and sub-tropical regions. Thus, while a dozen or so may be termed "Indian" species, coming from India, including Ceylon and the Malay Peninsula and Islands, a similar number are known to be natives of Tropical and Sub-tropical Africa, including the adjacent islands, Madagascar, Mauritius, Bourbon, the Seychelles, &c.; another dozen or so are indigenous in Australia, New Zealand, and the Pacific Islands, the habitats of some of the latter occasionally extending to the Malay Archipelago and Peninsula: the greatest portion of the genus, however, includes plants native of Tropical America. The majority of Cyatheas are, like the closely-allied Alsophilas and Dicksonias, highly decorative and deservedly popular Tree Ferns, extensively used for the embellishment of our conservatories and winter gardens, though some of them, on account of the great similarity in their general appearance, are seldom met with outside botanical gardens.

Whether of gigantic habit or otherwise, all Cyatheas are of an arborescent nature; their trunks, which sometimes measure 40ft. and even more in height, *e.g.*, those of *C. divergens* and *C. medullaris*, are often aculeated (prickly), rarely perfectly smooth. With the exception of the comparatively dwarf

Indian *C. sinuata*, whose fronds are entire or undivided, and of the curious *C. Hookeri* and *C. Brunonis*, equally of Indian origin, and which are at first sight distinguished from all other species by their fronds being simply pinnate (only once divided to the midrib), all other Cyatheas have their fronds more or less decompoundly pinnate (repeatedly divided). The distinguishing characters of *Cyathea* are to be found in the disposition of the sori (spore masses), which are invariably situated either on a vein or in the axil of the forking of a vein; in the character of their receptacles, which are elevated, globose, or elongated; and especially in the singular nature of their globose, inferior involucres, which cover the whole sorus, and which, when mature, break at the summit and form a more or less persistent cup quite even or irregular at the margin.

Culture.

Some of the most beautiful of all known Tree Ferns are to be found in this genus. As regards the beauty of their foliage, they are equal in every respect to any Alsophila or Hemitelia, with which they are closely connected, while they offer a great variety in the sizes of their trunks; those inhabiting temperate regions, such as *C. dealbata*, *C. medullaris*, &c., are mostly stout and destitute of spines, whereas most of the tropical kinds are of a slender nature comparatively to their height, and, in many cases, are densely armed with stout spines. All the species are evergreen, and to make good growth require an abundance of water at the roots, as well as their trunks being kept constantly moist. By these means, and by them only, can Cyatheas be induced to produce fine heads of fronds, which last all the longer on the plants if they have gradually been inured to the sun during the summer. Like all other Tree Ferns, Cyatheas are satisfied with very little pot-room, and the soil in which they should be potted, tubbed, or, better still, planted in the Fernery, is a mixture of three parts fibrous peat, one of loam, and one of coarse silver sand. They are all of very easy culture, and, provided the moisture about the trunk and the roots be well attended to, there need be very little fear of failure in their cultivation. None among the numerous species known is in the habit of producing adventitious growths along the trunk or at the base, and none is known

to be proliferous. The plants are therefore usually propagated from their spores, which are abundantly produced and which germinate freely, making very showy young plants in the course of a couple of seasons.

Principal Species and Varieties.

C. aculeata—ac-u-lĕ-a′-ta (prickly).

The plant generally met with in gardens under this name, for which we cannot find any authority, is the same as *Alsophila aculeata* of J. Smith.

C. affinis—af-fi′-nis (related), *Swartz.*

A stove species, native of the Polynesian Islands. Its ample fronds are tripinnate (three times divided to the stalk of the leafy portion) and are furnished with oblong-spear-shaped leaflets 1ft. to 1½ft. long, bearing sessile pinnules (stalkless leafits) of a rigid, somewhat leathery texture, and divided again into strap-shaped segments barely ⅛in. broad. The upper surface of the fronds is smooth, but the lower one is slightly scaly. The sori (spore masses) are disposed along the costa (midvein), and their firm, persistent involucres have a peculiar way of breaking up irregularly.—*Hooker*, *Synopsis Filicum*, p. 27.

C. albifrons—al′-bif-rons (white-fronded), *Vieillard.*

This stove species, native of New Caledonia, has a very peculiar appearance, produced by the grey-coloured stalks of its ample fronds, which are tripinnate (three times divided to the midrib), provided with leaflets 1ft. to 1½ft. long, bearing crowded, strap-shaped, and distinctly-stalked pinnules (leafits) 3in. to 4in. long, about 1in. broad, of a rigidly leathery texture, and again divided into blunt, strap-shaped, distinctly-notched segments. Both sides of the frond are smooth and the lower surface is quite white. The moderately large sori (spore masses) are disposed nearer the edge than the costa (midvein); they are covered by involucres of a membranous (parchment-like) texture bursting irregularly.—*Hooker*, *Synopsis Filicum*, p. 453.

C. aneitense—an-ei-ten′-sĕ (from the Island of Aneiteum), *Hooker.*

A very distinct, greenhouse species, with a smooth trunk. The fronds, of a somewhat parchment-like texture, are borne on strong stalks of a purple-

black colour and quite smooth. Their leaflets, 1in. to 1½in. long, 4in. to 5in. broad, are sessile (stalkless) or nearly so, oblong, and cut nearly to the rachis (stalk of the leafy portion). The abundant sori (spore masses) are placed midway between the midvein and the margin, and are covered by thin, parchment-like, persistent involucres, which soon break down and generally open at the back, so as to form a large, loose, almost transparent, two-lobed, often irregularly-lacerated cup.—*Hooker*, *Synopsis Filicum*, p. 26.

C. angolensis—an-go′-len-sis (from Angola), *Welwitsch.*

A greenhouse species, native of Benguilla, District of Huilla, Tropical West Africa, where it is reported to occur at altitudes varying between 3500ft. and 5500ft. It is said to be rare in its native habitat and to have fronds 6ft. to 8ft. long, produced from a trunk which attains 12ft. to 15ft. in height and about 2ft. in circumference. This species is doubtfully distinct from the better-known *C. Dregei*, which, however, is usually of shorter stature.—*Hooker*, *Synopsis Filicum*, p. 22.

C. arachnoidea—ar-ach-nŏ-i′-dĕ-a (cobwebby), *Hooker.*

A distinct, greenhouse species, native of the Island of Ternate, and of very peculiar appearance through all its dark-coloured rachises (stalks of the leafy portion of the fronds) being muricated (rough with short, black, sharp spines) and densely clothed with a rusty tomentum. Its fronds are tripinnate (three times divided to the midrib), of a firm, leathery texture, smooth and shiny above, and cobwebby beneath. The sori (spore masses) are disposed near the middle of the pinnules (leafits) and occupy the whole space between the midrib and the recurved margin; the involucres, of a thin, parchment-like texture, are white and delicate, and break into variously-lobed and laciniated segments.—*Hooker*, *Synopsis Filicum*, p. 24.

C. arborea—ar-bor′-ĕ-a (arborescent), *J. Smith.*

A stove species, also known as *C. Grevilleana*, native of the West Indian Islands and most abundant in Jamaica. It is very variable in general appearance, its trunk and stalks being sometimes quite smooth, but at other times copiously prickly and very strongly so at the base of the stalks: this species is also equally variable as regards the colour of its stalks, which are

pale brown, dark purple, or even black. The ample fronds are bipinnate (twice divided to the midrib), and furnished with stalkless, oblong-spear-shaped leaflets 5in. to 8in. long, deeply pinnatifid (cut nearly to the midrib), and sometimes again pinnate; the lobes or pinnules thus formed are oblong, finely toothed, of a dark green above, and paler below. The involucres (coverings of the spore masses) are of a pale or dark brown colour and exactly cup-shaped when mature, and show a very even margin.—*Hooker*, *Species Filicum*, i., p. 17. *Nicholson*, *Dictionary of Gardening*, i., p. 415.

C. assimilis—as-sim′-il-is (very like), *Hooker*.

This handsome, greenhouse species, first discovered by Thomas Lobb on the hills in Sarawak, Borneo, is a gigantic grower, its trunk often being 20ft. high. The stalks of the fronds are slightly rough, of a bright chestnut-colour, and fringed on one side with long, rusty-coloured scales. Its ample fronds are bi- or tripinnate (twice or three times divided to the midrib), being furnished with broad-oblong, smooth leaflets 1ft. long and 3in. to 4in. broad. These leaflets are divided into pinnules (leafits) which are again cut almost to the midrib, their lowest inferior lobe being always the smallest. The sub-globose sori (spore masses) are covered by very thin and filmy involucres, which at first are entire, but eventually break into very irregular lobes.—*Hooker*, *Synopsis Filicum*, p. 24.

C. aurea—au′-rĕ-a (golden), *Klotzsch*.

A strong-growing, greenhouse species, native of the Andes of Columbia. Its ample fronds are tripinnatifid (thrice divided nearly to the midrib), being furnished with oblong-spear-shaped leaflets 1½ft. to 2ft. long, divided into sessile pinnules (stalkless leafits) of a peculiar, strap-shaped form, 3in. to 4in. long, 1in. broad, subdivided into falcate (sickle-shaped), toothed segments of a moderately firm texture, smooth on their upper surface. The sori (spore masses), disposed on the midvein, are covered by small involucres of a delicate, tender nature.—*Hooker*, *Synopsis Filicum*, p. 451.

C. barbata—bar-ba′-ta (bearded), *Bory*.

A stove species, native of Guadeloupe, with ample fronds borne on slightly rough, nearly naked stalks and furnished with leaflets 1ft. long and 4in. to

5in. broad. The leaflets are again divided into sessile (stalkless) leafits ½in. broad, strap-shaped, and cut down to a narrow wing. The sori (spore masses), situated on the midvein, are covered by minute, smooth, and fragile involucres.—*Hooker*, *Synopsis Filicum*, p. 451.

C. Beyrichiana—Bey-rich-ĭ-a′-na (Beyrich's). Synonymous with *Hemitelia setosa*.

C. Boivini—Boi-vi′-ni (Boivin's), *Mettenius*.

A strong-growing, stove species, native of Madagascar, of no particular decorative value.—*Hooker*, *Synopsis Filicum*, p. 452.

C. Brackenridgei—Brack-en-ridg′-ĕ-i (Brackenridge's), *Mettenius*.

A strong-growing, stove species, native of the Solomon Islands, and only peculiar through its tripinnate (thrice-divided), ample fronds, of a dark green colour on their upper surface and paler beneath, being borne on smooth stalks of an uncommon greyish colour, and showing on their ribs singular small, white, bullate (blister-like) scales.—*Hooker*, *Synopsis Filicum*, p. 452.

C. Brunonis—Bru-no′-nis (Brown's), *Wallich*.

A very distinct and peculiar, stove species, native of the Malay Islands, and, according to Beddome, abundant in the Islands of Penang, Molucca, and Borneo. It and *C. Hookeri* are the only species known with simply-pinnate (only once-divided) fronds. These are large, and have their oblong-spear-shaped leaflets, which are from 8in. to 14in. long, finely acuminate (ending in a long, tapering point) and of a peculiarly glossy nature.—*Hooker*, *Species Filicum*, i., p. 15. *Beddome*, *Ferns of British India*, t. 87.

C. Burkei—Bur′-kĕ-i (Burke's). Synonymous with *C. Dregei*.

C. cameroonіana—cam-er-oo-nĭ-a′-na (Cameroonian), *Hooker*.

An African, greenhouse species, native of the Cameroon Mountains, where it is found at elevations varying between 3000ft. and 4000ft. Its fronds, 4ft. or more in length and 14in. to 16in. broad, are borne on scaly stalks 1ft. to 2ft. long; they are bipinnate (twice divided to the midrib), quite smooth, dark green on their upper surface, paler beneath, and of a somewhat leathery texture. The leaflets, 6in. to 8in. long and sessile (stalkless), are

divided to the midrib or sometimes only deeply pinnatifid, being cut into shallow, blunt, nearly sickle-shaped pinnules or lobes about ½in. long and notched on the margins. The sori (spore masses), disposed at the fork, are covered with very thin, parchment-like involucres of an ephemeral nature, leaving a shallow, ragged cup, and most permanent at the lower side.—*Hooker*, *Synopsis Filicum*, p. 21.

C. canaliculata—can-a-lic-ul-a′-ta (channelled), *Willdenow.*

This stove species, native of the Mauritius, Bourbon, and Madagascar Islands, is very distinct, but varies much in the size of its pinnules (leafits). It forms a trunk of a dark brown colour, 10ft. to 12ft. high, and of comparatively slender proportions. The fronds, which are borne on smooth stalks covered with long, black, chaffy scales, are from 4ft. to 5ft. long, and bipinnate (twice divided to the midrib); the leaflets are 8in. to 18in. long, equally pinnate or deeply pinnatifid (cleft nearly to the midrib), of a leathery texture and perfectly smooth, dark green above and paler below. Their pinnules (leafits) are sessile (stalkless) and deeply dented on the margins. The sori (spore masses), which occupy most of the pinnule and are situated at some distance from the midvein, are covered by involucres that are globose (round) at first, but eventually break down into three or four tolerably regular lobes.—*Hooker*, *Synopsis Filicum*, i., p. 23, t. 11B. *Nicholson*, *Dictionary of Gardening*, i., p. 415. *Lowe*, *Ferns British and Exotic*, viii., t. 55.

C. castanea—cas-tan′-ĕ-a (chestnut-coloured), *Baker.*

A greenhouse species, native of the Andes of Peru. Its ample fronds are tripinnatifid (thrice divided partly to the midrib), borne on naked stalks of a peculiar chestnut-brown colour, and covered with spear-shaped scales, usually dark glossy brown with a pale edge. The sori (spore masses), disposed on the costa (midvein), are covered by smooth involucres of a persistent nature, splitting irregularly when mature.—*Hooker*, *Synopsis Filicum*, p. 451.

C. crenulata—cre-nu-la′-ta (scalloped), *Blume.*

A stove species, native of Java, with smooth stalks and somewhat leathery fronds; the latter are usually twice divided to the midrib into

oblong-spear-shaped pinnules (leafits) of a dark livid green, paler beneath, and minutely chaffy on the midveins. The sori (spore masses), situated close to the midvein, are covered by parchment-like involucres of a pale or chestnut-brown colour, breaking into very irregular lobes.—*Hooker*, *Species Filicum*, i., p. 25.

C. Cumingii—Cu-ming′-ĭ-i (Cuming's), *Baker*.

A stove species, native of Coral and Pitcairn's Islands, with ample, tripinnate fronds, borne on densely muricated (rough) stalks and furnished with oblong-spear-shaped leaflets 1½ft. to 2ft. long; the leaflets are subdivided into numerous sessile pinnules (stalkless leafits) of a firm and almost leathery texture. The sori (spore masses), sometimes as many as twenty to a segment, fill up the whole space between the midrib and the edge; they are covered by large, fragile involucres of a smooth nature.—*Hooker*, *Synopsis Filicum*, p. 453.

C. Cunninghami—Cun′-ning-ham-i (Cunningham's), *Hooker*.

This beautiful, greenhouse species, native of New Zealand, is somewhat closely related to the better-known and justly popular *C. medullaris*. It is not, however, such a robust grower, its trunk being generally only from 12ft. to 15ft. high. The fronds, of a somewhat leathery though flaccid (soft) texture, withering on the trunk, are ample and tripinnate (three times divided to the midrib); the leaflets, 1½ft. to 2ft. long, are divided into pinnules (leafits) which are only pinnatifid at their extremity, but in their other parts are subdivided into linear, blunt lobes. Each of the lobes bears, nearer the midvein than the margin, a sorus (spore mass) which is covered by a roundish and very thin involucre, at first entire, but eventually breaking down very irregularly, and often leaving a large, spreading lobe or scale on the under-side.—*Hooker*, *Synopsis Filicum*, p. 25. *Nicholson*, *Dictionary of Gardening*, i., p. 415.

C. cuspidata—cus-pid-a′-ta (pointed), *Kunze*.

A stove species, having a great resemblance to *C. arborea*, from which it differs principally through the nature of the involucres, which, instead of having an even margin, burst very irregularly when mature.—*Hooker*, *Species Filicum*, i., p. 19, t. 12A.

C. dealbata—dĕ-al-ba′-ta (whitened), *Swartz.*

This beautiful Fern, deservedly the most popular species of the whole genus, is a native of the Northern and Middle Islands of New Zealand. Although Humboldt, in his "Views of Nature," states that Ernst Dieffenbach saw, in the most northern of the three Islands of New Zealand, trunks of *C. dealbata* rising to a height of 42½ft., such specimens are very rare in their native places, the plants seldom exceeding 15ft. in height. The handsome fronds, which are borne on smooth, or at the most slightly rough, stalks, are from 5ft. to 7ft. in length, of a glaucous (bluish-green) colour above and very glaucous or silvery beneath ; they are bi- or tripinnate (twice or three times divided to the midrib) and somewhat spear-shaped, and are divided into narrow, pointed pinnules (leafits) which have their sickle-shaped segments conspicuously toothed. The reddish-brown sori (spore masses), which form a most interesting feature, are abundant, and produce a most pleasing contrast with the white colour of the under-side of the leaflets, to the lower half of which they are sometimes confined, though usually disposed midway between the midvein and the margin ; they are covered by roundish involucres of a thin and more or less transparent nature, which break down in an irregular manner.—*Hooker, Species Filicum*, i., p. 27. *Nicholson, Dictionary of Gardening*, i., p. 415. *Lowe, Ferns British and Exotic*, viii., t. 58.

Fig. 15. Cyathea dealbata (much reduced).

When planted in a conservatory and in a somewhat elevated position, a specimen of *C. dealbata* makes a very noble object, and the peculiar colour

of the under-side of its fronds shows itself to perfection when seen by artificial light.

C. divergens—di-ver′-gens (spreading outwards), *Kunze.*

This greenhouse species, native of New Granada, Peru, and Ecuador, where it is found growing at an altitude of 11,000ft., is one of the tallest members of the genus, its trunk being often 40ft. in height and 1ft. in diameter. The large and smooth fronds are usually about 7ft. long including their stalks, which are stout, rough, and clothed on the upper side with firm, spear-shaped scales of an intensely black colour and pale-margined ; they are bipinnate (twice divided to the midrib), with about twelve pairs of leaflets of a firm, leathery texture, which in their turn are deeply pinnatifid (cut more than half-way down to the midrib). The abundant sori (spore masses) are disposed on the midvein, and covered by thin, fragile involucres, which soon break in a very irregular manner.—*Hooker*, *Species Filicum*, i., p. 19, t. 11A.

C. Dregei—Dre′-gĕ-i (Drege's), *Kunze.*

A stove species, also known as *C. Burkei*, native of Natal, Macalisberg, and Zambesi Land, with a trunk seldom more than 4ft. high and very thick. Its fronds are bipinnate (twice divided to the midrib), borne on smooth stalks, and furnished with stalkless pinnules (leafits) 2in. to 3in. long, which are also cut into blunt, somewhat sickle-shaped, and more or less deeply-toothed lobes. The sori (spore masses), disposed half-way between the midvein and the margin, are covered by thin, fragile involucres, which, opening at the summit, form cups with a small, slightly irregular margin.—*Hooker*, *Species Filicum*, i., p. 23, t. 10B. *Nicholson*, *Dictionary of Gardening*, i., p. 415.

C. excelsa—ex-cel′-sa (tall), *Swartz.*

A stove species, of large dimensions, native of the Mauritius and Bourbon Islands. Its fronds, borne on smooth stalks, are bipinnate (twice divided to the midrib), being furnished with leaflets 2ft. long and 6in. to 8in. broad, which in their turn are again cut into stalkless, deeply-pinnatifid pinnules (leafits), thus forming oblong lobes which are toothed and sharply pointed. The sori (spore masses) are disposed in the fork near the midvein, and are covered by

thin, very glossy involucres, which break irregularly.—*Hooker*, *Species Filicum*, i., p. 24, t. 12B. *Nicholson*, *Dictionary of Gardening*, i., p. 415. *Lowe*, *Ferns British and Exotic*, viii., t. 56.

C. frondosa—fron-do′-sa (leafy), *Karsten.*

This greenhouse species is a native of the Andes of Bogota, where it is found at elevations varying between 8000ft. and 9000ft. It is a particularly robust grower, forming a lofty, smooth trunk, furnished with gigantic fronds, 12ft. to 14ft. long and about 6ft. broad; its large leaflets are divided into pinnules (leafits) 4in. to 5in. long and broadly spear-shaped, and the latter are divided again into oblong lobes with conspicuously-recurved margins. The sori (spore masses), situated near the midvein, are covered by roundish involucres of a smooth nature, opening irregularly at their summit.—*Hooker*, *Synopsis Filicum*, p. 18.

C. funebris—fu-ne′-bris (dark, funereal). A garden name for *C. sclerolepis.*

C. furfuracea—fur-fur-a′-cĕ-a (scurfy), *Baker.*

A stove species, native of Jamaica, with ample, tripinnate fronds of a soft, papery texture and of a smooth nature, except on the midrib on the under-surface, where they are densely clothed with somewhat egg-shaped and closely-pressed scales of a pale brown colour. The stalk of the leafy portion of the frond is brown and densely hairy above; that of the leaflets is scaly. The sori (spore masses), disposed on the midvein, are covered with small, smooth involucres of a very fragile nature.—*Hooker*, *Synopsis Filicum*, p. 450.

C. Gardneri—Gard′-ner-i (Gardner's), *Hooker.*

This greenhouse species, native of Brazil, is of peculiar aspect, and is remarkable for the singular appearance of its pinnules (leafits), which are adnate (attached along their whole length to the stalk of the leafy portion). The sori (spore masses) cover the whole under-side of the lobes, and are covered by almost globose, opaque involucres of a pale brown colour, which, when ripe, curiously burst with a small aperture at the top; these involucres are also of an unusually persistent nature.—*Hooker*, *Species Filicum*, i., p. 21, t. 10A.

C. gracilis—grac′-il-is (slender), *Grisebach.*

A stove species, of comparatively small dimensions, native of Jamaica, with fronds bipinnate (twice divided to the midrib) and borne on stalks that are strongly muricated (rough with short, hard excrescences) at the base. A very peculiar feature is given to this plant by the unusually well-marked stalked character of the pinnæ and pinnules (leaflets and leafits), which are borne on stalks generally 2in. to 2½in. long and are deeply pinnatifid, being eventually divided into blunt, oblong lobes toothed on their margin. The abundant sori (spore masses) are usually confined to the superior half of the lobes, and are covered with dark brown involucres, which, when ripe, burst into somewhat regular valves or lobes to near the cup-like base.—*Hooker*, *Synopsis Filicum*, p. 18.

C. Grevilleana—Grev-il-lĕ-a′-na (Greville's). Synonymous with *C. arborea.*

C. Hookeri—Hook′-er-i (Hooker's), *Thwaites.*

This very distinct and peculiar, stove species is a native of the Forest of Singhe Rajah, Ceylon, and though of comparatively dwarf dimensions, is arborescent; its trunk seldom exceeds 1½in. in thickness. The fronds, 2ft. to 3ft. long and 4in. to 5in. broad, borne on short, black stalks that are muricated (rough with short excrescences) at the base, are simply pinnate (only once divided to the midrib), and only pinnatifid at their extremity. The leaflets, of a somewhat leathery texture, are sub-sessile (almost stalkless) and auricled on both sides at the base; they are coarsely toothed or undulated, and more or less entire towards their extremity. The sori (spore masses) are disposed on the veins or in the lower axils, and are covered by involucres which, when ripe, break into irregular lobes.—*Hooker*, *Synopsis Filicum*, p. 16. *Nicholson*, *Dictionary of Gardening*, i., p. 415. *Beddome*, *Ferns of Southern India*, t. 260.

C. horrida—hor′-rid-a (horrid). The Fern usually found in collections under this name is really *Hemitelia horrida.*

C. Imrayana—Im-ray-a′-na (Imray's), *Hooker.*

This greenhouse species appears to be a high mountain Fern, having been gathered in Caracas and on the Blue Mountain Peak in Jamaica at 5000ft. elevation. Its fronds are usually bipinnate (twice divided to the

midrib), of a somewhat leathery texture, and have their under-side more or less copiously clothed with rusty-brown down and scurfy with small and often bubble-like scales. The sori (spore masses), situated near the midvein, are covered by roundish involucres of a fragile nature, eventually breaking down very irregularly.—*Hooker*, *Species Filicum*, i., p. 18, t. 9B.

C. incana—in-ca′-na (hoary), *Karsten.*

A greenhouse species, native of the Andes of Columbia, with ample fronds of singular appearance on account of the grey colour of their rachis (stalk of the leafy portion). The upper surface of the somewhat leathery leaflets is of a dark green colour, while the lower surface, and especially the midrib, is densely clothed with minute, fimbriate (fringed) scales. The sori (spore masses), situated on the midvein, are covered by small involucres of a densely hoary nature.—*Hooker*, *Synopsis Filicum*, p. 18.

Fig. 16. Pinnule of Cyathea insignis
(½ nat. size).

C. insignis—in-sig′-nis (remarkable), *Eaton.*

This truly magnificent, stove species, usually found in collections under the names of *C. princeps* and *Cibotium princeps*, is a native of Cuba, Mexico, and St. Catherine's Peak, where it grows at an elevation of about 5000ft. It forms a stout trunk of large dimensions, producing numerous beautifully arching fronds from 10ft. to 12ft. long, borne on robust stalks thickly covered at their base and up to the leafy portion with long, glossy scales of a light brown colour, but eventually whitish, and quite brittle to the touch.

They are tripinnate (three times divided to the midrib), having sessile (stalkless) leaflets, pinnatifid nearly to the midrib, and divided into oblong-sickle-shaped, sinuate or toothed lobes, with slightly reflexed margins (Fig. 16). The bright green colour of the upper surface of the fronds forms a pleasing contrast to the beautifully glaucous (bluish-green) hue of their under-side. The abundant sori (spore masses) are provided with very peculiar involucres of a cinnabar-brown colour, often breaking down into four nearly equal valves.—*Hooker*, *Synopsis Filicum*, p. 17. *Nicholson*, *Dictionary of Gardening*, i., p. 415.

C. integra—in′-teg-ra (entire), *J. Smith.*

A stove species, native of Amboyna and the Philippine Islands, with a smooth trunk and ample fronds. The latter are furnished with leaflets 1½ft. long, of a firm, parchment-like texture, brownish-green above, paler beneath, and smooth on both surfaces. The sori (spore masses) are disposed in two series intermediate between the midvein and the margin, and are covered by pale involucres, which, when ripe, break down into a persistent, lobed cup. *C. petiolata* is another name for this species.—*Hooker*, *Species Filicum*, i., p. 26. *Nicholson*, *Dictionary of Gardening*, i., p. 415.

C. Kirkii—Kirk′-ĭ-i (Dr. Kirk's), *Hooker.*

A little-known, stove species, native of Johanna Island, where it was discovered growing at 2000ft. elevation. It is a Fern with smooth trunk and stalks and ample fronds. The sori (spore masses), situated close to the midvein near the base of the lobe and covered by thin involucres, break down into irregular lobes, but with the largest lobe generally at the inferior base of the sorus, thus approaching the genus *Hemitelia*.—*Hooker*, *Synopsis Filicum*, p. 22.

C. Lenormandi—Le-nor′-mand-i (Lenormand's), *Vieillard.*

A handsome, stove species, from New Caledonia, closely resembling in texture and in general aspect the better-known *Dicksonia Berteroana.* Its ample fronds are tripinnate (thrice divided to the midrib) and furnished with oblong leaflets about 1ft. long, which are divided into spear-shaped pinnules (leafits) 2½in. to 3in. long, the lower ones distinctly stalked, the others nearly stalkless. The texture is rigidly leathery and both surfaces

are naked, the upper one being dark green and the lower slightly glaucous. The sori (spore masses), which are unusually large and fill up the fertile pinnules, except the very tip, are covered by parchment-like, smooth involucres, which eventually burst irregularly.—*Hooker*, *Synopsis Filicum*, p. 454.

C. Lindeniana—Lin-den-ĭ-a′-na (Linden's). A synonym of *C. mexicana*.

C. Lindsayana—Lind-say-a′-na (from Mount Lindsay), *Hooker*.

This greenhouse species, of large dimensions, with smooth trunk and stipites (frond-stalks), is the first true Cyathea that was found in Australia, in the north-east part of which it occurs on Mount Lindsay. Its ample fronds are of a glabrous (smooth) nature, except on the midrib, which is somewhat hairy and shows many scattered, small, bubble-like scales. The leaflets are about 2ft. long and pinnate (cut to the midrib) nearly to their extremity; the leafits thus formed, 3in. to 4in. long, oblong, and pointed, are deeply pinnatifid (cut nearly to the midrib), their lobes being nearly sickle-shaped and conspicuously toothed on the margin. The sori (spore masses), disposed at the forking of the veins on the lower half of the lobes, are covered by roundish, brown involucres of a firm, parchment-like texture, which open with a circular, rather small, and jagged mouth.—*Hooker*, *Synopsis Filicum*, p. 25.

C. Lobbiana—Lob-bĭ-a′-na (Lobb's), *Hooker*.

A stove species, native of Sarawak, Borneo, in general aspect resembling *Alsophila alternans*, from which, however, it is easily distinguished by its roundish sori (spore masses), rarely produced in the axils of the veins, being disposed in two rows on each side of the midvein of each segment, and covered by involucres of a very thin texture, at first investing the whole sorus, but eventually breaking down irregularly.—*Hooker*, *Synopsis Filicum*, p. 24.

C. Manniana—Man-nĭ-a′-na (Mann's), *Hooker*.

This greenhouse species, native of Fernando Po and the Cameroon Mountains, where it grows at elevations of 3000ft. to 4000ft., is quite distinct from any other known Tropical African Cyathea. Its trunk, which attains 30ft. in height, produces ample fronds of a somewhat leathery texture, smooth, and tripinnate (three times divided to the midrib). The leaflets, 2ft. long and about 8in. broad, are divided into narrow-oblong and somewhat sickle-shaped,

sharp-pointed pinnules that are toothed on the margin. The sparingly-produced sori (spore masses) are rather large and disposed mostly on the lower half of the pinnules (leafits), where they are mixed with ovate (egg-shaped), conspicuously fringed scales; they are covered by deep, cup-shaped involucres, which break down at the margin and are somewhat persistent.—*Hooker*, *Synopsis Filicum*, p. 21.

C. medullaris—med-ul-la′-ris (pithy), *Swartz.*

This is a magnificent and deservedly popular greenhouse species; it cannot be mistaken, as no other known Tree Fern bears the slightest resemblance to it (see Plate). It is a native of New Zealand, Norfolk Island, and the Pacific Islands, where, according to Lowe, the soft, pulpy substance which occupies the centre of the trunk, and which somewhat resembles sago, forms a common article of food; it has also been found in the colony of Victoria, by Baron Von Mueller. It is the most gigantic-growing species known in the whole genus, and produces, in its native habitats, a trunk upwards of 40ft. in height, bearing magnificent spreading fronds 12ft. to 15ft. long and proportionally broad, bi- or tripinnate (twice or three times divided to the midrib), and of a leathery texture. These are borne on robust stalks, at first of a peculiar prune-colour, but with age becoming jet-black and beautifully polished. Before they are fully unfolded, the young fronds are densely clothed with long, black, chaffy scales, which later on change to a bright, light brown colour. In the fully-developed fronds, the stalks and also the midribs are rough with hard, glandular tubercles of a glossy nature and resembling a resinous exudation. The pinnæ (leaflets), fully 3ft. long, are divided into secondary pinnæ 5in. to 6in. long, about 1in. broad, deeply pinnatifid (cleft nearly to the midrib) or again pinnate; these are again cut into pinnules or segments of oblong or narrow-oblong shape, blunt, coarsely toothed in barren fronds, lobed and pinnatifid in the fertile ones, with the margins turned back. The sori (spore masses), abundantly produced and orange-yellow in colour, are disposed one to each lobule of the pinnule or lobe, and are situated about midway between the midvein and the margin; they are covered by circular involucres of parchment-like texture, which soon break open at the summit with an irregular, often two-lobed margin. The whole surface of the frond is of a most pleasing, bright green colour.—*Hooker*,

Species Filicum, i., p. 27; *Garden Ferns*, t. 25. *Nicholson*, *Dictionary of Gardening*, i., p. 415. *Lowe*, *Ferns British and Exotic*, viii., t. 57.

C. medullaris is of very rapid growth; when planted in a conservatory where plenty of room can be allowed for its perfect development, it makes a good-sized stem or trunk in a comparatively short time, and proves by far the most imposing of all known Tree Ferns which will succeed under cool treatment.

C. meridensis—me-rid-en′-sis (from Merida), *Karsten.*

A greenhouse species, native of Merida, Columbia, where it is found growing at an altitude of 6000ft. It is of medium growth only, and is distinguished from nearly all other species through the sessile (stalkless) character of its pinnules (leafits), which are spear-shaped, 3in. to 4in. long, cut down to a narrow wing, of a firm texture, smooth on their upper surface, but scaly on the ribs on their under-side. The small, roundish sori (spore masses) are covered by smooth involucres that break up irregularly.—*Hooker*, *Synopsis Filicum*, p. 450.

C. mexicana—mex-ic-a′-na (Mexican), *Schlechtendahl.*

This greenhouse species, native of Mexico, frequently found in collections under the name of *C. Lindeniana*, is smooth-stemmed. Its fronds are bipinnate (twice divided to the midrib), their smooth, spear-shaped pinnules (leafits), 3in. to 4in. long, being cut into oblong, slightly sickle-shaped lobes that are somewhat blunt and toothed. The sori (spore masses) are disposed chiefly at the lower half of the lobe, on the back of a simple vein or at the forking of a divided vein, and are covered by very thin and fragile involucres, which are soon obliterated.—*Hooker*, *Species Filicum*, i., p. 15.

C. microphylla—mi-croph-yl′-la (small-leaved), *Mettenius.*

This remarkable and most distinct, greenhouse species, native of the Andes of Peru and Ecuador, is a miniature Tree Fern with very finely-divided fronds and the smallest pinnules (leafits) of any species in the genus. Its trunk, which seldom exceeds 4ft. in height, produces fronds 2ft. to 3ft. long, oblong-egg-shaped, sharp-pointed, and tripinnate (three times divided to the midrib). The broadly-oblong, sharp-pointed leaflets are stalkless, and their

pinnules, of the same shape and scarcely $\frac{1}{8}$in. long, are deeply pinnatifid, being cleft into oblong, blunt, entire lobes. Each lobe bears a solitary sorus (spore mass), covered by a roundish involucre that eventually breaks irregularly into three or four portions.—*Hooker*, *Second Century of Ferns*, t. 99. *Nicholson*, *Dictionary of Gardening*, iv., p. 524.

C. Milnei—Mil′-nĕ-i (Milne's), *Hooker.*

A strong-growing, greenhouse species, native of Sunday or Raoul Island (of the New Zealand region), having the general aspect of *C. affinis*, but making a smooth trunk 30ft. in height and 9in. in diameter. Its fronds, of a somewhat leathery texture, are blackish-green above, and paler, though not glaucous (bluish-green), beneath. The leaflets, 1½ft. to 2ft. long and 6in. to 10in. broad, are divided into elongated-oblong pinnules (leafits) that are deeply pinnatifid, forming oblong-sickle-shaped lobes, with the margins toothed and slightly recurved. The abundant sori (spore masses) are moderately large and mostly situated at the base of the lobes near the vein ; they are covered by rather firm, long-persistent involucres of a cup-like form, with very irregular margins occupying most of the breadth of the lobes.—*Hooker*, *Synopsis Filicum*, p. 26.

C. Moorei—Moor′-ĕ-i (Moore's), *Baker.*

A greenhouse species, native of Lord Howe's Island, having a general habit very like that of *Alsophila australis*, but distinct through its fronds being regularly tripinnate (three times divided to the midrib), and also through its small sori (spore masses) being medial and covered by depressed, fragile involucres, breaking up irregularly and sometimes quite disappearing.—*Hooker*, *Synopsis Filicum*, p. 453.

C. patens—pat′-ens (spreading), *Karsten.*

A greenhouse species, native of the Andes of Bogota, and much resembling *C. frondosa* (from the same habitat) : it differs principally through its larger sori (spore masses) and its pinnules (leafits), which have short but conspicuous stalks.—*Hooker*, *Synopsis Filicum*, p. 451.

C. petiolata—pet-ĭ-ol-a′-ta (petiolate, stalked). Synonymous with *C. integra.*

C. pilosa—pil-o′-sa (hairy), *Baker.*

This strong-growing, greenhouse species, native of the Andes of East Peru, has ample fronds, borne on straw-coloured and densely-hairy stalks. They are tripinnate (three times divided to the midrib), and their leaflets, about 1½ft. long, are furnished with close, stalkless pinnules (leafits), cut down to a narrow wing. The leafits are again cut into close, ligulate (strap-shaped), blunt segments of a thin texture, while both surfaces of the whole frond, but especially the lower one, are densely hairy on the ribs. The small sori (spore masses) are covered by smooth involucres of a fragile nature, which burst irregularly when ripe.—*Hooker*, *Synopsis Filicum*, i., p. 19.

C. princeps—prin′-ceps (princely). Synonymous with *C. insignis*, which is more extensively known in gardens as *Cibotium princeps.*

C. sclerolepis—scle-rol′-ep-is (having hard spines), *Baker.*

A stove species, from New Caledonia, usually found in gardens under the name of *C. funebris*, for which we can find no authority. Its fronds, seldom more than 3ft. long and tripinnate (three times divided to the midrib), are borne on greyish stalks, rough with hard and sharp points, and furnished at their base with very firm, shining scales of a brown-black colour. The leaflets are less than 1ft. long; they are furnished with sessile pinnules (stalkless leafits) about 2in. long, cut down into blunt, entire, sickle-shaped segments of a moderately firm texture. Both the surfaces are green and smooth, and the small and abundant sori (spore masses) are covered by smooth involucres of a parchment-like texture.—*Hooker*, *Synopsis Filicum*, p. 453.

C. sechellarum—se-chel-la′-rum (from the Seychelles), *Mettenius.*

A stove species, native of the Seychelles Islands, much resembling in habit the Indian *C. spinulosa*, though otherwise distinct from that species. Its leathery fronds, dark green above and paler beneath, are borne on rough stalks of a dark purple colour; they are furnished with leaflets 1½ft. to 2ft. long and 8in. to 9in. broad, divided into oblong and deeply-pinnatifid pinnules (leafits), forming narrow-oblong, sharp-pointed, sickle-shaped lobes toothed on their margin. The sori (spore masses), mostly disposed in the lower half of the lobes and near the midvein, are covered by persistent involucres of a parchment-like texture.—*Hooker*, *Synopsis Filicum*, p. 22.

C. serra—ser′-ra (saw-toothed), *Wallich.*

A stove species, of medium dimensions, native of the West Indies, Brazil, and Mexico, with fronds bipinnate (twice divided to the midrib) and borne on stalks that are more or less rough with hard, sharp points, and covered with whitish scales fully 1½in. long. The spear-shaped pinnules (leafits) with which they are furnished are deeply pinnatifid, thus forming linear-oblong, sickle-shaped lobes, toothed like a saw on the margin and of a smooth nature. The sori (spore masses), which generally cover the whole of the lobes, are covered by involucres of very thin texture, at length forming a shallow cup, which is entire or more or less torn at the margin.—*Hooker, Species Filicum*, i., p. 17, t. 9A. *Nicholson, Dictionary of Gardening*, i., p. 415.

Fig. 17. Frond of Cyathea sinuata
(¼ nat. size).

C. sinuata—sin-ŭ-a′-ta (unevenly lobed), *Hooker and Greville.*

This rare, stove species, of small dimensions, native of Ceylon, where it is found on the wooded mountains, and most abundant in the Singhe Rajah Forest, if not the smallest, is undoubtedly the most elegant and graceful of the Cyatheaceous plants, and the only one at present known having simple (undivided) fronds. It is a miniature Tree Fern, particularly elegant in all its parts, as it forms a caudex (trunk) 2ft. to 4ft. high and seldom thicker than an ordinary walking-stick. The fronds, which are abundantly produced, are of a light shining-green colour and of a thin texture, with pretty and distinct venation, undivided, 2ft. to 3ft. long, 1½in. to 2½in. broad, with undulated margins; they taper at their base into a very short stalk (Fig. 17). The sori (spore masses), roundish and of a bright brown colour, are disposed on each side of the midvein and covered by persistent involucres which eventually

break and form a shallow cup with an even margin.—*Hooker*, *Species Filicum*, i., p. 15. *Nicholson*, *Dictionary of Gardening*, i., p. 415. *Beddome*, *Ferns of Southern India*, t. 259.

C. Smithii—Smith′-ĭ-i (Smith's). A garden name for *Hemitelia Smithii*.

C. speciosa—spec-ĭ-o′-sa (beautiful). The Fern commonly known in gardens under this name is *Hemitelia* (*Amphicosmia*) *speciosa* of Hooker.

C. spinulosa—spi-nul-o′-sa (somewhat spiny), *Wallich*.

A greenhouse species, native of India, and Tsus-Sima, South Japan. Beddome, who says that it is found in Southern India, on the Shevagherry Hills, adds that although Moore gives the Neilgherries as a locality, he has never met with it on those hills. It is a robust plant, distinct from most others by the strongly and conspicuously thorny nature of the dark purple stalks of its ample, somewhat flaccid fronds. The oblong, pointed leafits are cut into sharp-pointed, finely-toothed lobes. The abundant sori (spore masses) are situated close to the midveins, and are covered by roundish, very thin and fragile involucres, which soon break irregularly.—*Hooker*, *Species Filicum*, i., p. 25, t. 12G. *Nicholson*, *Dictionary of Gardening*, iv., p. 524. *Beddome*, *Ferns of Southern India*, t. 57.

C. Sprucei—Spru′-cĕ-i (Spruce's), *Hooker*.

This greenhouse species, whose caudex (trunk) often attains 15ft. in height, is a native of Ecuador, where it is found on Montaña di Canelos and Tungaragua, growing at altitudes varying between 4000ft. and 6500ft.; also on Chimborazo, at elevations between 3000ft. and 4000ft. Its spear-shaped fronds, about 5ft. long and bipinnate (twice divided to the midrib), are borne on stout, strong stalks about 1ft. long, clothed at their base with very long, pale scales of a silky or woolly nature; besides these they bear on their whole length strong black spines intermixed with long and slender ones of an exceedingly fragile nature. The oblong leaflets, 1ft. to 2ft. long, are divided into horizontal, almost stalkless, narrow-oblong pinnules (leafits) that are deeply pinnatifid, forming narrow-egg-shaped lobes with slightly-recurved margins. The abundant sori (spore masses) are covered by fragile involucres, which eventually break into irregular lobes.—*Hooker*, *Synopsis Filicum*, p. 20.

C. vestita—ves-ti′-ta (clothed), *Martius*.

A greenhouse species, native of Guiana, Brazil, and Columbia. Its ample fronds are tripinnatifid (three times divided half-way to the midrib), and have a straw-coloured and densely-hairy rachis (stalk of the leafy portion). Their oblong-spear-shaped leaflets, 1ft. to 1½ft. long, are divided into sessile pinnules (stalkless leaflets) 2½in. to 3in. long, cut down to a narrow wing into closely-set, ligulate (strap-shaped), blunt segments of thin texture, and with both surfaces, especially the lower one, densely hairy. The very small sori (spore masses), situated on the midvein, are covered by hairy involucres of a fragile nature, which burst irregularly.—*Hooker*, *Species Filicum*, i., p. 20.

C. Welwitschii—Wel-wit′-schĭ-i (Welwitsch's), *Hooker*.

This greenhouse species, native of West Africa and the Island of St. Thomas, where it is found at various altitudes between 3000ft. and 7000ft., is distinct from all other known species, and remarkable through its fronds, 3ft. or more long and of a somewhat leathery texture, being sub-sessile (nearly stalkless). This character is produced by their lower portion being provided with leaflets gradually more dwarfed and extending nearly to the base of the stalks, which are as thick as a swan's quill, and covered with large, firm, glossy scales. The leaflets in the middle portion of the frond are 6in. long, 1in. broad, and pinnatifid only at their short-pointed extremity, where they form blunt and somewhat sickle-shaped, conspicuously-toothed pinnules or lobes. The whole frond is of a dark green colour and slightly hairy above, paler and more hairy underneath. The sori (spore masses), mostly situated near the base of the pinnules and near the midvein, are covered by shallow, cup-shaped involucres, which surround the whole base of each sorus.—*Hooker*, *Synopsis Filicum*, p. 21.

CYCLODIUM—Cy-clo′-dĭ-um. *See* **Aspidium.**
CYCLOPELTIS—Cy-clop-el′-tis. *See* **Aspidium.**
CYRTOMIPHLEBIUM—Cyr-tom-iph-leb′-ĭ-um. *See* **Polypodium.**
CYRTOMIUM—Cyr-tom′-ĭ-um. *See* **Aspidium.**

CHAPTER IX.

CYSTOPTERIS, *Bernhardi.*

(Cys-top′-ter-is.)

Bladder Fern.

THE name of this small genus is derived from *kystis*, a bladder, and *pteris*, a Fern, evidently in allusion to the nature of the indusium (covering) of each spore mass being inflated like a bladder. In Hooker and Baker's "Synopsis Filicum" *Cystopteris* forms Genus 19, and it is closely allied to *Woodsia* and *Microlepia*. It is composed entirely of elegant and somewhat fragile little Ferns, and has its headquarters in the Temperate Zone of both hemispheres. All the species have their fronds twice or three times divided, of thin texture, and with veins free. The distinguishing characters of the genus, however, reside in each sorus (spore mass), of a roundish form, being placed on the back of the veins and provided with a nearly globular involucre of a membranous (thin and more or less transparent) nature, which is inserted by its broad base under the sorus, and at first covers it like a hood.

Culture.

Notwithstanding its being small, this genus, which is composed of only four species and a few varieties, is nevertheless very interesting, inasmuch as, with the exception of the essentially North American *C. bulbifera*, all others are indigenous to this country and well adapted for planting in the outdoor Fernery, where shady and well-drained spots should be selected for them,

all being found growing naturally at high elevations. With the exception of *C. montana*, which is provided with underground creeping rhizomes, all the Cystopterises produce their slender fronds in great abundance either from a closely-tufted crown or from shortly-decumbent rhizomes. On account of their delicate appearance, all are well adapted for pot-culture, either under glass, in a cold frame, or without glass protection, in a sheltered position. All the known species and varieties are naturally of a thoroughly deciduous nature, losing their fronds early in the autumn and remaining dormant until about April, during which period their crowns must not be allowed to get completely dry. When planted out, a compost of about equal parts of fibrous peat, loam, and leaf mould is the one which suits all Cystopterises best. For pot-culture it is advisable to add to this mixture a small proportion of old, crumbled mortar or broken limestone, and also to pay special attention to the drainage.

The Bladder Ferns are usually propagated during March and April by division of the crowns, wherever more than one has formed; they are also easily raised from spores sown in autumn in a cold frame. *C. bulbifera*, however, is more readily increased by means of the bulbils produced along its rachises (stalks of the leafy portion of the frond), which, having fallen to the ground, soon emit a few slender roots and send up some rudimentary fronds, producing perfectly-developed foliage during the second year.

Species and Principal Varieties.

C. alpina—al-pi′-na (mountain-loving), *Desvaux*.

This pretty little Fern, also known as *C. regia*, is one of the rarest species indigenous in Great Britain—so rare, indeed, that for a long time it appeared very doubtful if it could be classed among the British species; but that it is one of our native Ferns is quite certain now. In the second edition of Ray's "Synopsis," published in 1696, we find that a Mr. Lhwyd first discovered it on Snowdon. Later on it was again found in Wales, this time by a Mr. Griffiths, on Cwm Idwell; while Mr. W. Christy met with it at Knaresborough, where it was growing on rocks. It was also found, in 1793, at Low Leyton, Essex, by a Mr. Forster, who notified his discovery at the time in Symon's "Synopsis." The Alpine Bladder Fern was again found at

Low Leyton in 1835 by Mr. Pamplin, and also in 1840 by Mr. E. H. Bolton. Later still, Mr. Thomas Moore received some specimens of it from Mr. Shepherd, of Liverpool, who stated that they had been gathered in Yorkshire and Derbyshire, but gave no further information; and we also find that, on the authority of Mr. Maughan, Hooker mentions its having been found on Ben Lawers, in Scotland. It is also a native of the mountains of Europe, from Sweden to Greece and Spain, and Asia Minor, and it is stated in the "Synopsis Filicum" (p. 103) to have been naturalised in England on a wall at Low Leyton, Essex, where, Mr. E. J. Lowe says, it formerly was abundant, but is now very rare. A further and most interesting contribution to the discovery and history of this rare species is furnished by the late Sir J. E. Smith, who says: "The lowland station of this Fern, close to a much-frequented road at Low Leyton, where I have, in company with the late Mr. Forster, seen it covering great part of a brick wall, may be supposed analogous to its place of growth in France; but we seek in vain for any information on this head either in Vaillant or Lamarck, nor is it evident that the latter ever found the plant. The wall at Low Leyton has been repaired, and the Fern almost destroyed. On Snowdon it is said to be very scarce, though Mr. Wilson, with his usual bounty, has sent me an ample supply of specimens of various sizes. He describes it as 'varying greatly in size and appearance, but always distinct from *C. fragilis*.' It is unquestionably distinct from any other British Fern, though the proper name and synonyms were not discovered till after its appearance in English botany, where I fell into the same error with some foreign botanists. Linnæus once thought it a Swedish plant, but erroneously, nor had he an original or authentic specimen."

C. alpina is a very pretty Fern, with fronds 4in. to 8in. long, 1in. to 2in. broad, oblong-spear-shaped, tripinnatifid (three times divided half-way to the midrib), and borne on slender stalks 2in. to 4in. long and of a pale green colour. The largest leaflets are spear-shaped, 1in. to 1½in. long and ½in. to ¾in. broad; their pinnules (sub-divisions), of a soft, papery texture, are cut down again into slightly-toothed segments, upon which the small and abundant spore masses, covered by involucres of a thin, transparent nature, are disposed from two to twelve to a pinnule.—*Hooker*, *Species Filicum*, i., p. 199; *British Ferns*, t. 24. *Nicholson*, *Dictionary of Gardening*, i., p. 428. *Lowe*, *Ferns British and Exotic*, vii., t. 30; *Our Native Ferns*, ii., t. 67.

C. bulbifera—bul-bif′-er-a (bulbil-bearing), *Bernhardi.*

This singular and elegant species, which takes its name from the large, fleshy bulbils borne its upper leaflets (Fig. 18), is a very distinct plant, essentially of North American origin, and quite as hardy as any of the British kinds. According to Eaton, it is found growing wild on dripping rocky banks and in moist places amongst rocks, and sometimes where there are

Fig. 18. Frond of Cystopteris bulbifera (nat. size).

no rocks, from Canada and New England to Tennessee, and westward to Wisconsin and Arkansas. It is not universally distributed over the country, and seems to prefer a calcareous soil. The fronds, which wither at the first appearance of frost, are of a thin, papery texture, and yet not without a kind of brittle rigidity; they are produced from a rootstock that is usually quite short, seldom over 1in. long, and covered with the persistent and somewhat

Fadyenia prolifera

(½ nat. size).

fleshy bases of the old stalks. In mature plants they are usually 6in. to 12in. long and 3in. to 4in. broad at their widest part; but Prof. F. L. Harvey mentions fronds measuring, with their stalks, fully 4ft. in length. They are usually lanceolate (spear-shaped) frequently much elongated upwards, and bi- or tripinnatifid (twice or three times divided half-way to the midrib); their broadest part is at the base, where the leaflets are often 2in. to 3in. long, 1in. broad, and divided into narrow-oblong segments cut down nearly to the midrib and slightly toothed; thence they gradually narrow to their extremity, having, according to Eaton, a narrower and more tapering outline than any other known North American Fern with compound and feathery fronds. The stipes (stalks) are usually 4in. to 6in. long, very slender, smooth, and of a brittle nature, usually green, except at the base, where they are dark brown; but sometimes the whole stalk and rachis (stalk of the leafy portion) are brownish to the very extremity of the frond. The sori (spore masses) are produced so abundantly as to be found on all portions of the frond, even to the base; they are disposed two to twelve to a pinnule and usually in two rows, one in each segment. The bulbils, by which this species is readily distinguished from all others and by means of which it is easily propagated, are usually found on the under-side of the fronds, mostly at the base of the leaflets, but they often occur in various positions. They consist of two —sometimes three, and even four—rounded, fleshy, cotyledon-like, greenish or deep-coloured masses containing a rudimentary frond or two between their bases. It is somewhat surprising that such an elegant species, perfectly hardy and so prone to reproducing itself by both its bulbils and its spores, should not have become naturalised in England. According to Lowe, it was introduced in 1648 by Mr. Tradescant, who then sent it to the Royal Gardens, Kew.—*Hooker*, *Species Filicum*, i., p. 199. *Nicholson*, *Dictionary of Gardening*, i., p. 429. *Eaton*, *Ferns of North America*, ii., t. 53. *Lowe*, *Ferns British and Exotic*, vii., t. 36.

C. fragilis—frag′-il-is (fragile), *Bernhardi.*

This is probably the commonest of the known species of *Cystopteris*, and it possesses a peculiarly cosmopolitan character; for, besides being a thoroughly British Fern, it is found in all parts of Europe and Asia, everywhere from Iceland to Kamtcshatka; from the Arctic regions to Madeira and the Himalayas,

where it grows at 15,000ft. elevation; it occurs also on the mountains of Abyssinia and Fernando Po; in South Africa; in New Zealand, Tasmania, and the Sandwich Islands, where it is often spoken of as *C. tasmanica* and *C. sandwicensis*, and in some parts of South America. In North America, where it is known as the "Brittle Fern," Eaton tells us that it is found growing in crevices of shaded rocks and among stones, less commonly at the bases of trees, or in earth along rivulets, from Arctic America to Tierra del Fuego, and adds that it is one of the most universally-distributed of Ferns. It is, however, as a British Fern that the Brittle Bladder Fern is most interesting. It was first mentioned as a native of Britain, in 1696, in the second edition of

Fig. 19. Frond of Cystopteris fragilis
(nat. size).

his "Synopsis Methodica Stirpium Britannicarum," by Ray, who there calls it *Filix saxatilis caule tenui fragile*, or Fine-cut Stone Fern, with slender and brittle stalks. It flourishes in mountainous districts, especially on old walls and chalky, damp, shaded rocks. It has been found growing plentifully at Richmond and Settle, in Yorkshire; near Buxton and Matlock, in Derbyshire; at Cheddar, in Somersetshire; near Hyde, in Gloucestershire; near Bristol; at Exwick, near Exeter, and in numerous other places in England. The Brittle Fern is also a native of Ireland, being found in Kerry, at Lough Inn, and at Lough Derryclare, Connemara. In Wales it has frequently been gathered in a cave at Clogwyn Coch, Snowdon; on rocks above Cwm Idwell;

near Twll Der, and near Wrexham. It has also been collected in Scotland, in Aberdeenshire, Moray, Ross-shire, and near Maens, in Berwickshire; near Killin, Perthshire; in Sutherland, and on the Kincardineshire coast.

C. fragilis is readily distinguished by its fronds, 4in. to 8in. long, 1½in. to 3in. broad, somewhat spear-shaped, and bi- or tripinnatifid (twice or three times divided half-way to the midrib), being abundantly produced from a close, tufted crown, and borne on smooth, reddish-brown stalks 2in. to 4in. long, of a very slender and brittle nature. The largest pinnæ (leaflets), 1in. to 1½in. long and ¾in. broad, are divided into oblong pinnules (leafits), which are cut down into bluntly- or sharply-toothed lobes (Fig. 19). The texture is soft and papery, and the abundant sori (spore masses) are disposed two to twelve to a pinnule.—*Hooker*, *Species Filicum*, i., p. 197. *Nicholson*, *Dictionary of Gardening*, i., p. 429. *Eaton*, *Ferns of North America*, ii., t. 53. *Beddome*, *Ferns of British India*, t. 91. *Lowe*, *Ferns British and Exotic*, vii., t. 31; *Our Native Ferns*, ii., t. 63.

This species requires a suitable situation to develop and preserve its true character, as it is very liable to alter its growth according to its position. It is reported that in the Southern parts of Mexico, in the Hawaian Islands, and in the Canaries, fronds over 1ft. in length are very common. Besides being amongst the most plentifully-represented in Great Britain, this species, which sometimes occurs in such abundance as to give a character to the place, is also the one which has produced the greatest number of varieties, some of which are so constant and so very striking as to appear as so many distinct species. Such are the following, all of which require treatment similar to that recommended for the typical species:

C. f. angustata—an-gus-ta′-ta (narrow), *Smith.*

The "Deep-cut or Red-stalked Bladder Fern," as this variety is commonly called, is sometimes also found under the name of *C. rhætica*, on account of its having first been discovered in Rhætia, and is a much stronger grower than *C. fragilis*. Its fronds frequently attain 1¼ft. in length, inclusive of the stalks, which are of a dark red colour, becoming quite black in the autumn. They are bipinnate (twice divided to the midrib), being furnished with long, narrow, tapering, pointed leaflets, divided into deeply-lobed pinnules (leafits) with sharply-toothed segments. *C. f. angustata* has been gathered near

Llanberis, in North Wales, and at Gordale, in Craven, Yorkshire, where it is found in wooded places, on mountains and on shaded rocks; in many parts of Scotland, occupying similar situations; on the mountains of Westmoreland; on the summit of the Glyder Peaks, on the side overhanging Glyn Ogwen Lake; and on the Leek Road, about a mile from Buxton.—*Nicholson*, *Dictionary of Gardening*, i., p. 429. *Lowe*, *Our Native Ferns*, ii., p. 433.

C. f. cristata—cris-ta′-ta (crested), *Lowe.*

This most interesting form was raised from spores by Mr. Elworthy, of Nettlecombe, near Taunton. Its fronds, about 8in. long, are furnished with leaflets somewhat more distinctly placed than usual, and in the lower portion of the frond conspicuously crested, becoming more or less normal in the upper half; they branch and are distinctly crested at their summit.—*Lowe*, *Our Native Ferns*, ii., p. 432, fig. 851.

C. f. decurrens—de-cur′-rens (decurrent), *Moore.*

A singular form, partaking of characters intermediate between *C. f. dentata* and *C. f. Dickieana*, found at Silver Cove, near Wemyss Castle, Fifeshire. Its leaflets, deflexed or turned back, have their pinnules decurrent (running down) and prominently toothed.—*Lowe*, *Our Native Ferns*, ii., p. 428, fig. 841.

C. f. dentata—den-ta′-ta (toothed), *Hooker.*

Although a form of British origin, the "Toothed Bladder Fern" appears to have been passed entirely unnoticed by the earlier botanists; but about 1784 Mr. Dickson found it in clefts of rocks in the Highlands of Scotland. In England it has been gathered between Widdy Bank and Caldron Snout, in Durham; while in Wales several places boast of its presence, as it has been collected in Denbighshire, on rocks north of Trejorwerth, in Anglesey, on Snowdon, in Flintshire, at Llangollen, and at the foot of the walls of Castle Dinas Bran. Its fronds are narrow, seldom exceeding 6in. in length, and are not of quite so brittle a nature as those of the typical species; they are bipinnate (twice divided to the midrib), furnished with oblong and bluntly-toothed pinnules (leafits), and borne on slender, smooth and shining stalks of a brownish-purple colour.—*Lowe*, *Our Native Ferns*, ii., t. 64. *Nicholson*, *Dictionary of Gardening*, i., p. 429.

C. f. Dickieana—Dick-ie-a′-na (Dr. Dickie's), *Moore.*

This remarkably pretty, dwarf variety—undoubtedly the most distinct fixed form of *C. fragilis*—was originally found by Dr. Dickie growing on dripping rocks in a cave at Cove, near Aberdeen. Its characters are so peculiar, and it possesses the property of reproducing itself so truly from spores, that some authorities are inclined to give it the rank of species. It is distinct from the above-named species by its much denser habit and more ovate (egg-shaped) fronds (Fig. 20), the height of which is seldom above 5in., including their short stalks; these latter are thicker than those of any other kinds belonging to the genus, and have their base densely coated with

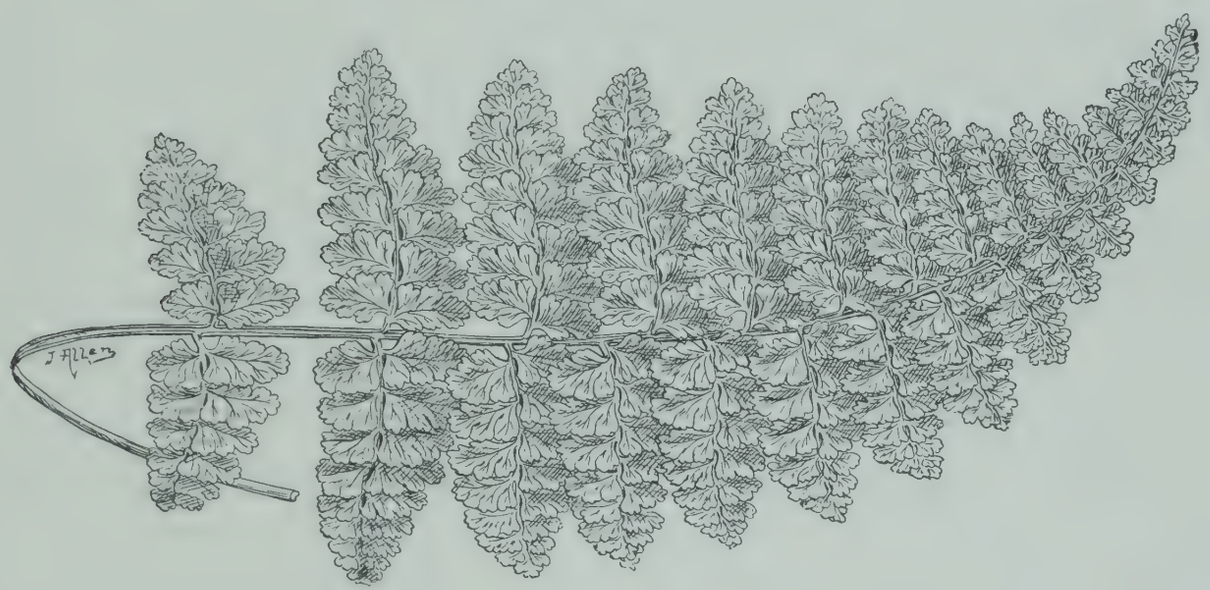


Fig. 20. Frond of Cystopteris fragilis Dickieana (nat. size).

brown scales. The pinnæ (leaflets) are sometimes deflexed (thrown back), while in other cases they affect a horizontal position; they are somewhat egg-shaped, slightly twisted, and disposed so close together as to become imbricated (overlapping); their pinnules (leafits), also broader than usual, are oblong, crowded, overlapping, and bluntly toothed. The mode of fructification is equally distinct, as the sori (spore masses) never run together, but are situated at the ends of the veins so as to form a marginal beading round each lobe. *C. f. Dickieana* is altogether a distinct plant, neither monstrous nor distorted, and is freely reproduced from spores, retaining all its distinctive characters.—*Lowe, Our Native Ferns*, ii., t. 65. *Nicholson, Dictionary of Gardening*, i., p. 429.

C. f. furcans—fur′-cans (forked), *Moore.*

A charming and distinct form, found on Ben Lawers, and also at Killin, in Perthshire. It is distinguished from the normal form by the forkings of the leaflets and of the extremity of its fronds, which are about 9in. long and 1½in. to 2in. broad.—*Lowe, Our Native Ferns*, ii., t. 66.

C. f. interrupta—in-ter-rup′-ta (interrupted), *Wollaston.*

This essentially distinct form may also be termed a remarkable monstrosity, as its fronds, usually about 15in. long, including their stalks, are sometimes linear (narrow), and occasionally bifid or multifid (twice- or much-cleft). They are always very narrow and usually ½in. to 1in. broad, and are furnished with leaflets devoid of all regularity, the basal ones being sometimes quite normal and the others interrupted, contracted, and furnished with irregular and more or less fan-shaped pinnules (leafits).—*Lowe, Our Native Ferns*, ii., p. 430, fig. 846.

C. f. sempervirens—sem-per-vir′-ens (evergreen), *Moore.*

This form, native of Madeira, but which is said to have been found also at Tunbridge Wells and in Devonshire, remains evergreen when kept in a cool greenhouse during the winter. Some authors give it as a species. It is a thoroughly distinct plant, producing from a short-creeping rhizome its narrow-spear-shaped fronds, about 6in. long, and borne on short stalks of a peculiarly tough nature.—*Lowe, Our Native Ferns*, ii., p. 427.

C. f. tenuis—ten′-ŭ-is (slender), *Schott.*

A North American form, with fronds of a remarkably slender nature, about 1ft. long, and produced from a slightly-creeping rhizome. They are oblong-spear-shaped, tripinnatifid (three times divided half-way to the midrib), the leaflets being profoundly cleft, bluntly toothed, and of a bluish-green colour.—*Lowe, Ferns British and Exotic*, vii., t. 35.

C. montana—mon-ta′-na (mountain-loving), *Link.*

The Mountain Bladder Fern is a very handsome plant, quite distinct in habit from all other species and varieties belonging to the same genus; for its lovely and very elegant fronds, which are delicately divided, strikingly

triangular in outline, about 6in. each way (Fig. 21), instead of emanating from either a compact crown or a short rhizome as in other kinds, are produced on very slender, underground rhizomes, such as are noticed in the Marsh Shield Fern, *Nephrodium* (*Lastrea*) *Thelypteris*, or in the common Oak and Beech Ferns, *Polypodium Dryopteris* and *P. Phegopteris*. They are borne on slender, erect stalks, from 6in. to 9in. long, perfectly smooth,

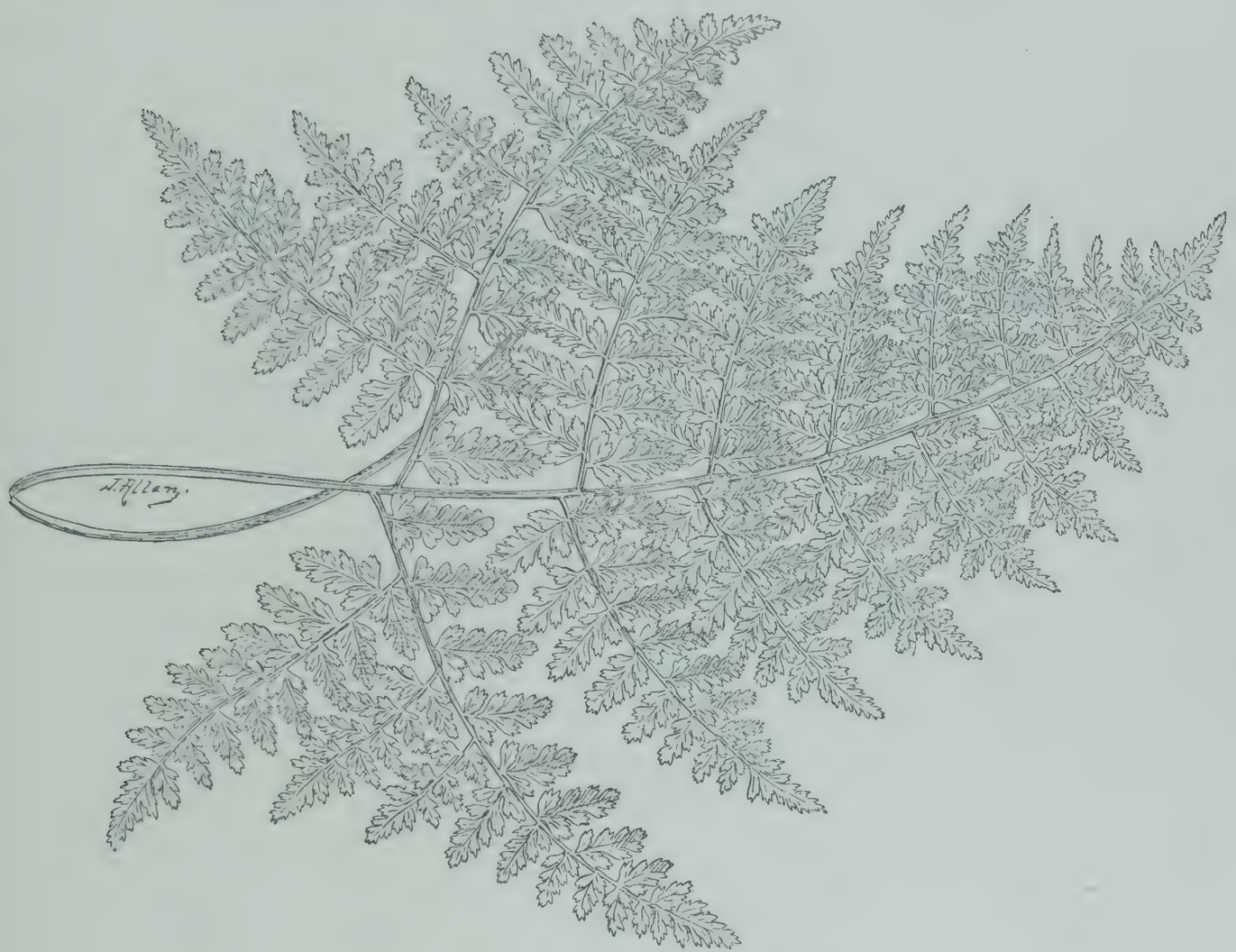


Fig. 21. Frond of Cystopteris montana
(¾ nat. size).

except near their base, where there are a few light-coloured scales, and are quadri-pinnatifid (four times divided half-way to the midrib) and of a light green colour.

Eaton, who says that this species is one of the rarest North American Ferns, states that it is found growing by the side of streams in shady alpine woods in the Rocky Mountains of British America, and on the North Shore

of Lake Superior. It is also found in similar situations in Central Europe, in the mountains of Jura and Dauphiné, in the Swiss and Austrian Alps, and on the Pyrenees. It is, however, as a British species that it is most interesting, inasmuch as its discovery is of comparatively recent date; for it was only in 1836, when it was first found by Mr. W. Wilson on Ben Lawers, that it was accepted as a British species, though it has long been known as a Fern peculiar to the high alpine districts of Europe. The history of the Mountain Bladder Fern is so very interesting that we cannot do better than quote the observations made by the late Thomas Moore: "The head-quarters in Britain of this very rare and local Fern are the Highlands of Scotland, where it grows on mica schist, and where it was first found on Ben Lawers by Mr. W. Wilson, in company with Professors Hooker and Graham, in 1836, and subsequently by Messrs. Gourlie, Adamson, Borrer, and Little, and Dr. Walker Arnott, in 1841, 1850, and 1851, in a ravine called Corrach Dh'Oufillach, or Corrach Uachdar, between Glen Dochart and Glen Lochay, in the Mhiel Oufillach Mountains, in Perthshire. It is reported to have also been found in North Wales by Plukenet, and we are informed that the existence of the species in Wales has been recently confirmed, though the information is incomplete. It is not, however, improbable, as the species is met with in the Alps of Europe, occurring most frequently in the North, and generally on rough, stony ground. This is strictly an alpine plant, and requires treatment similar to that recommended for other species, with perfect rest in winter."—*Hooker*, *Species Filicum*, i., p. 200. *Nicholson*, *Dictionary of Gardening*, i., p. 429. *Lowe*, *Our Native Ferns*, ii., t. 68. *Eaton*, *Ferns of North America*, ii., t. 53.

As will be seen from the above remarks, *C. montana* is essentially a local Fern, which cannot, it is believed, be well grown in the hardy Fernery. This belief is probably owing to failures through having only small plants to begin with. The species is still so scarce that large plants of it cannot easily be obtained, and small ones require particular care for some time. In trying it, a sheltered, moist, and sunless part of the hardy Fernery must be chosen. Devote to it a level spot 1ft. square, remove the soil about 10in. deep, half-fill the hole thus formed with broken bricks, or other porous material, and in the remaining space put some very fibrous peat, mixed with a little loam and silver sand. Plant in this, and cover with a bell-glass, having its rim raised

an inch or so above the surface for ventilation; but beware of snails. Keep the soil always moist while the plant is growing, and remove the glass as soon as the Fern appears sufficiently well established. When it has made vigorous growth it will not require any further protection.

The above advice is that which was given us by the late Mr. R. Sims, who, at Foot's Cray, was most successful in the cultivation of all British Ferns, and especially of those considered exceptionally delicate and difficult to manage. To this generous advice we entirely owe our success in growing satisfactorily this beautiful species which, with us, had always proved unmanageable, and we strongly advise Fern-lovers to give it a fair trial, following the above instructions.

C. regia—re′-gĭ-a (majestic). A synonym of *C. alpina.*

C. rhætica—rhæ′-tic-a (Rhætian). This is identical with *C. fragilis angustata.*

C. sandwicensis—sand-wic-en′-sis (Sandwich Islands). A synonym of *C. fragilis.*

C. tasmanica—tas-ma′-nic-a (Tasmanian). A synonym of *C. fragilis.*

CHAPTER X.

DANÆA, *Smith.*

(Da′-næ-a.)

IN Hooker and Baker's "Synopsis Filicum" this well-marked genus, which is a division of the sub-order *Marattiaceæ*, forms Genus 71. It is dedicated to Pierre Martin Dana, a writer on the plants of Piedmont, and is entirely composed of plants whose fronds, usually pinnate (once divided to the midrib), seldom simple (undivided), of a fleshy and leathery nature, are produced from a woody rhizome, and have their pinnæ (leaflets) usually articulated. The species are restricted to Tropical America, and though totally distinct, and some of them very handsome, they are seldom found in collections on account of the difficulties connected with their cultivation, which up to the present time has not been very successful. The distinctive characters of *Danæa* reside in the sori (spore masses) occupying the whole length of the veins, and being so crowded as to cover the whole under-surface of the divisions of the fertile fronds, which in all cases are different from the barren ones. The stalks are fleshy, and have from one to five nodes (knots) similar to those observable, in smaller quantities, in Marattias.

Culture.

It is a matter of regret that the requirements of these interesting Ferns should be so little understood. Although several importations have taken place within the last few years, none of the species have become plentiful: the various kinds of treatment have invariably produced unsatisfactory results.

Cases after cases of these plants, and especially of the beautiful *D. crispa*, have reached England in excellent condition, the plants when unpacked being in some instances the very picture of health ; yet none, to our knowledge, have prospered, and the most that has been done with them has been to keep them alive for three or four years, during which time they have gradually dwindled away. Notwithstanding these repeated failures, the beauty of some of the known kinds is such that, should the opportunity of growing them present itself again, they would be well worthy of further trials. They usually come over in their native soil, which appears to be a light, yellow, sandy loam of a very porous nature ; and they are said to grow naturally in warm, constantly moist, and somewhat close and shady situations.

Principal Species.

D. alata—al-a′-ta (winged), *Smith.*

This species, native of the West Indies, has barren fronds 1ft. to 1½ft. long, 6in. to 8in. broad, and borne on stalks that are densely scaly and only once knotted ; they are furnished with eight to ten pairs of leaflets, the central ones short-stalked, 3in. to 5in. long, ¾in. broad, with their extremities cuspidate (gradually tapering into a sharp, stiff point), toothed on their margins, and rounded at the base. The fertile fronds, which have their leaflets more distinctly stalked, 1in. to 3in. long and ¼in. broad, are borne on longer stalks than the barren ones.—*Hooker and Greville*, *Icones Filicum*, t. 18. *Nicholson*, *Dictionary of Gardening*, i., p. 439.

D. crispa—cris′-pa (curled), *Endres.*

By far the most beautiful species with which we are acquainted. It is a native of Costa Rica, and Endres, who discovered it there, says it grows in permanently moist places, where the soil is formed of sandy, porous loam and vegetable *débris* in about equal parts. Its beautiful fronds (Fig. 22), oblong in shape and 6in. long by 3in. broad, are translucid, like those of the popular *Todea superba*, and borne on short stalks that are only once knotted. The barren ones are furnished with from fifteen to twenty pairs of stalkless, strap-shaped, blunt leaflets, usually opposite, about ¼in. broad, and irregularly curled-toothed. The rachis (stalk of the leafy portion) is distinctly winged throughout, and, like the midribs, are densely scaly beneath. The fertile leaflets

are smaller, short-stalked, and more distantly placed than the barren ones, and their margins are not toothed.—*Reichenbach*, *Botanische Zeitung*, 1872, p. 489. *Hooker*, *Synopsis Filicum*, p. 525.

Fig. 22. Barren Frond and Portion of Fertile Frond of Danæa crispa (nearly nat. size).

D. elliptica—el-lip′-tic-a (elliptic), *Smith.*

This, the commonest known Danæa, is a native of South Brazil and the West Indies. It is also one of the strongest-growing species, and may be

readily distinguished from all others by the knotted nature of the frond-stalks, which sometimes show as many as five nodes (knots) disposed on their length

Fig. 23. Fertile and Barren Fronds of Danæa elliptica
(½ nat. size).

—usually about 1ft. The leafy portion of the barren fronds, 1½ft. to 2ft. long and 8in. to 12in. broad, is composed of from six to nine pairs of sessile pinnæ (stalkless leaflets), of a somewhat fleshy and leathery texture, 4in. to

6in. long and 1½in. broad, terminating in a sharp point (Fig. 23), sometimes entire and sometimes slightly toothed, and wedge-shaped or slightly rounded at the base. The fertile leaflets are of similar shape to the barren ones, but are narrower and more distinctly stalked.—*Hooker and Greville*, *Icones Filicum*, t. 51.

D. nodosa—no-do′-sa (knotted), *Smith.*

The barren fronds of this species, whose habitat extends from Cuba and Mexico to Brazil, and which is undoubtedly the most gigantic-growing kind known, are borne on short, strong, erect, knotted stalks; they are from 3ft. to 4ft. long, 1½ft. to 2ft. broad, and furnished with from ten to fifteen pairs of leaflets of a somewhat leathery texture. The upper leaflets are stalkless, the lower ones short-stalked, and all are of about the same size, 6in. to 12in. long and 1in. to 2in. broad, terminating in a sharp point, and either wedge-shaped or slightly rounded at their base. The fertile leaflets are shorter and much contracted, being only 4in. to 6in. long and ¾in. broad.—*Hooker and Greville*, *Icones Filicum*, t. 51. *Hooker*, *Synopsis Filicum*, p. 444.

D. simplicifolia—sim-plic-if-ol′-ĭ-a (having undivided fronds), *Rudge.*

This species, native of Guiana and North Brazil, is the only one known having simple (undivided) fronds. When barren, these fronds are from 6in. to 12in. long and 2in. to 4in. broad, and are borne on stalks 2in. to 12in. long, showing two nodes (knots), and slightly scaly below; they are of a somewhat leathery texture, egg-shaped or oblong, their summit terminating in a sharp point, their edge entire, and their base either wedge-shaped or rounded. When fertile, the fronds are of similar shape, but smaller in all their parts, and borne on longer stems.—*Hooker*, *Synopsis Filicum*, p. 442.

As an example of the prolific character of these Ferns, we have it on the authority of the "Synopsis Filicum" that on a specimen of *D. simplicifolia* that is only partially fertile there are about 100 capsules in the central synangia (row of united spore masses), and 30,000 to an entire frond.

D. Wendlandii—Wend-land′-ĭ-i (Wendland's), *Reichenbach.*

A close, compact-growing species, of dwarf habit, native of Costa Rica, with barren fronds oblong-spear-shaped, and borne on short stalks which, like

the rachis (stalk of the leafy portion), are narrowly winged and densely clothed with oblong scales in front. These fronds are furnished with about fifteen pairs of leaflets, all of which, except the uppermost, are short-stalked, oblong, sometimes sickle-shaped, and unequal at the base. The fertile fronds are taller, and are furnished with fewer narrow-strap-shaped leaflets, the upper surface of which is densely clothed with minute scales.—*Reichenbach*, *Botanische Zeitung*, 1872, p. 490.

Some seven or eight other species are described by Mr. Baker ; but they are known only from dried specimens in herbaria. The six above described are the only Danæas with which we are acquainted, and living specimens of which we have at different times had the opportunity of appreciating.

DAREA—Da′-rĕ-a. *See* **Asplenium.**

CHAPTER XI.

DAVALLIA, *Smith.*

(Dav-al′-lĭ-a.)

Hare's-Foot Ferns.

THIS large genus derives its name from Edmund Davall, a Swiss botanist, to whom it was dedicated by Smith; it is almost entirely composed of Ferns having their headquarters in the Tropics of the Old World. According to Hooker and Baker's "Synopsis Filicum," Tribe 4, the *Davallieæ*, is composed exclusively of the genus *Cystopteris*, already described, and of *Davallia*. In the above-named work *Davallia* forms Genus 18, and we find side by side in this genus plants with fronds varying in size and division, and also in texture, being sometimes herbaceous (soft and papery), and at other times coriaceous (of a leathery nature).

The mode of fructification in *Davallia* is so thoroughly distinct that there is very little difficulty in identifying the species when once their most distinctive characters are understood. In all Davallias the sori (spore masses) are either marginal or sub-marginal (disposed quite upon or close to the outer edge of the fronds); they are generally globose or roundish, but sometimes elongated, either laterally or vertically. They are disposed in shortly- but distinctly-stalked capsules, and are covered by involucres that are variable in form, being sometimes reniform (kidney-shaped), sometimes nearly round, always open at the summit, broadly fastened at the base, and generally united, though occasionally open at the sides. The veins are always free, and although there are a few exceptions, the majority of the species produce their

Dicksonia Berteroana, showing Habit and Upper Portion of detached Frond

(Habit, $\frac{1}{12}$ nat. size; Portion of Frond, $\frac{1}{4}$ nat. size).

fronds from rhizomes (prostrate stems) that are usually wide-creeping, scaly, and peculiarly predisposed to remain on the surface of the soil. The fronds are either simple (undivided), like those of *D. heterophylla;* pinnatifid (divided half-way to the midrib), like those of *D. pedata;* or more or less branched, like those of the popular *D. divaricata* (commonly called *D. polyantha*). As regards size, the fronds may be only 2in. or 3in. long, including the stalks, as is the case in the fully-developed ones of that Bornean little gem *D. parvula*, or they may attain as many feet, as is the case in the handsome and highly decorative *D. pallida* (*D. Mooreana* of gardens). It is mostly on these external characters that the genus has been subdivided into the following sections, all of which have been retained in the "Synopsis Filicum":

Acrophorus (Ac-roph′-or-us), *Moore.* A division which contains plants with characters deemed sufficiently distinct to be classified separately by Hooker and Baker under the headings of *Leucostegia* and *Odontoloma.*

Eudavallia (Eu-dav-al′-lĭ-a), *Smith.* This is the most extensive division of the genus; it is composed of a well-marked group of plants, all of which more or less closely resemble one another except in dimensions. All have ample fronds, deltoid (in shape of the Greek delta, Δ), tri- or quadripinnatifid (three or four times divided half-way to the midrib), and of a leathery texture. These species have their head-quarters in Polynesia and in South-Eastern Asia, and are entirely absent from the New World. They are distinguished by their semi-cylindrical or half-cup-shaped involucre (covering), which is of a leathery texture and attached at the sides as well as at the base. There are two sub-divisions:

A. *Prosaptia* (Pros-ap′-tĭ-a), *Presl.* A small group of Ferns, having the habit of *Lomaria* (*Blechnum*) *Spicant*, and in which the involucre is quite homogeneous with the texture of the frond.

B. *Scyphularia* (Scyph-ul-a′-rĭ-a), *Fée.* A small group of plants with fronds simply pinnate (once divided to the midrib), having only a few linear (long and very narrow) segments, 4in. to 6in. long, ½in. to ¾in. broad, and nearly entire.

Humata (Hum-a′-ta), *Cavanilles.* All the plants belonging to this section have fronds of a leathery texture, usually deltoid (in shape of the Greek delta, Δ), 3in. to 6in. long, more or less distinctly dimorphous (of two forms), the barren ones hardly more than once pinnatifid. Their involucres, of a

leathery texture, are ample, either sub-orbicular or reniform (kidney-shaped), and attached by a broad base; their summit and their sides are free. All the species contained in this section are natives of the Malayan Islands.

Leucostegia (Leu-cos-teg′-ĭ-a), *J. Smith.* The fronds of the plants contained in this section vary in size and in texture; with one exception (*L. ferulacea*), in which they are finely and repeatedly divided, they are three or four times divided half-way to the midrib, or pinnate (once divided to the midrib). Their pinnules are uniform on the lower and upper side; and the involucres covering the sori are attached as in *Humata*, but smaller, narrower, and thinner. Leucostegias are mostly inhabitants of Polynesia and Tropical Asia, several extending to the Himalayas, some to New Zealand, but none to either Africa or America. This section forms part of Moore's *Acrophorus.*

Loxoscaphe (Lox-os′-caph-e), *Moore.* This is a very natural group, allied in habit to *Darea*, but quite different in the fructification. All the species of which it is composed have decompound (much-divided) fronds with ultimate segments linear, and the involucres, which form a compressed sub-orbicular or cup-shaped pouch at the side of the segments, are open at their summit only.

Microlepia (Mi-crol-ep′-ĭ-a), *J. Smith.* A group of Ferns with fronds very variable in size, texture, and cutting. Although a few species belonging to it are American, this sub-genus has its head-quarters in South-Eastern Asia and Polynesia. The involucres covering their sori are membranous (thin and more or less transparent), shallowly half-cup-shaped, and attached at the sides as well as at the base. Microlepias further differ from Eudavallias, Humatas, and Leucostegias, in having the stems, except in *D. ciliata*, continuous with the caudex (main trunk of the root), and consequently fall under the primary division *Desmobrya* of J. Smith's classification.

Odontoloma (Od-on-tol-o′-ma), *Hooker.* This is a small natural group, very near the dimidiate *Lindsayæ*, which it thus connects with *Davallieæ.* They are nearly all inhabitants of Polynesia and South-Eastern Asia, and are readily distinguished from all others through the shape and texture of their pinnules, which are pellucido-herbaceous (thin, papery, and partly transparent), and dimidiate (resembling a quarter of a circle) in shape. Their involucres (coverings of the spore masses) are similar to those of *Leucostegia*, but have a tendency to become confluent.

Stenoloma (Sten-ol-o′-ma), *Fée*. A small group of Ferns with fronds very variable in size, but with the ultimate segments always cuneate (wedge-shaped), growing gradually wider from the base to the summit. The involucres, open only at the top, as in *Loxoscaphe*, are terminal on the segments instead of being disposed at the side. The species forming this last group are scattered throughout the tropics.

There are no representatives of the genus *Davallia* in England, and only one (*D. canariensis*) is known as a native of Europe. It is equally remarkable that no members of so extensive a genus should be found in North America, where nearly all other genera of Ferns are represented. With very few exceptions, Davallias, to whichever section they belong, are evergreen.

Culture.

The extensive and much-appreciated genus *Davallia* comprises many favourite species of great interest, all rivalling each other in usefulness and elegance, but varying essentially in form and habit. While a few of them are really interesting to the botanist, a great quantity of them are highly ornamental plants, suitable for decoration; while for exhibition purposes, or for growing in hanging baskets, few Ferns can be of greater service than Davallias, whether with long and drooping or with shorter and finely-divided fronds. They may be divided into two very distinct classes, the most conspicuous and most admired sorts forming a sort of natural group composed of the popular kinds, such as the Hare's-foot Fern (*D. canariensis*), the Squirrel's-foot Fern (*D. bullata*), the Bear's-foot Fern (*D. Tyermanni*), &c., all denominative names given to these interesting species in allusion to the brown, grey, or silver rhizomes with which they are provided, and which to a great extent resemble, when destitute of their foliage, the paws or feet of the animals to which they owe their popular names. The second section contains comparatively few species, equally beautiful, although deprived of the rhizomes which in the former section are a constant source of attraction.

As may be seen by the sub-divisions of the genus, Davallias are found widely distributed, for, although the majority of the species at present known come from the East Indies and the numerous islands of the Malayan Archipelago, some are natives of Australia, New Zealand, and Japan; while

in the South of Europe, Madeira, the Canaries, and the adjacent islands, the most popular species of all, and the one which gave its popular name to the section (*D. canariensis*), is found in abundance. In consequence of their being scattered over such a large area, and of their being found growing wild in such totally different habitats, many beautiful forms can be used to decorate either the cool or the tropical Fernery. Many of these may be grown with great advantage as basket plants, in which way they make charming objects, especially those species provided with slender and flexuose rhizomes, such as *D. bullata*, *D. canariensis*, *D. dissecta*, *D. Mariesii*, *D. pentaphylla*, and *D. Tyermanni*, whose habit is to twine round and cover anything on which they are allowed to grow. In Japan, *D. Mariesii* is made use of in a very peculiar way. Some sticks being tied together, so as to form various designs, such as crosses, wreaths, &c., and covered all over with moss, the slender and very pliable rhizomes are tied to them, several together; the sticks are then hung up in rooms or in the gardens under trees, and all the plants then require to produce their elegant fronds in profusion is a constant supply of moisture, which they get by an occasional dipping in water; by these means an enduring mass of verdure can be produced in a very short space of time.

If grown in either pots or pans, the Davallias that are provided with rhizomes require to be a little elevated above the rim of the pot, as nothing is more injurious to them than to have their rhizomes buried in the soil, especially the species whose rhizomes are clothed with large, chaffy scales. Besides being highly decorative plants as specimens, their fronds possess another equally desirable quality—that of lasting a very long time when severed from the plant, which renders them very useful for bouquet-making, and most valuable for the decoration of ladies' hair. Most of them are averse to heavy or close soil, and delight in a compost of light materials, made of three parts of fibrous peat, one part of chopped sphagnum moss, or, better still, of good leaf mould, if procurable, and one part of silver sand, with thorough drainage and an abundant supply of water at the roots during the growing season; while during the winter they must be watered only sparingly, never allowing them, however, even those that are deciduous, to become quite dry. This is a very important point, as, if the rhizomes are allowed to shrivel, the ensuing growth will be much weaker. The plants

require no syringing overhead, but derive much benefit from being kept near the glass, where good light is obtainable.

In the case of the species without rhizomes, the propagation is entirely dependent on the spores, which are abundantly produced, and which, if sown in heat, germinate freely and soon form little plants; while species provided with rhizomes may be increased by the division of these organs in the early spring. Where Davallias of the *dissecta*, *bullata*, and *Mariesii* types are required in quantities, it is much more satisfactory to raise seedlings; and if, as soon as they have produced a small rhizome 2in. long, repeated pruning of that organ is resorted to, they produce, in a remarkably short time, pretty, bushy little plants, through the branching of the rhizomes, which is the result of the above-named operation.

Principal Species and Varieties.

D. (Stenoloma) aculeata—Sten-ol-o′-ma; ac-u-lĕ-a′-ta (prickly), *Swartz.*

This very handsome, stove species, native of the West Indies, where it is said to be very common, is remarkable on account of its climbing habit, which resembles that of a bramble, according to Lowe, covering whole fields, and investing the largest "forest trees if growing near them." Its elegantly-divided fronds possess the singular property of lengthening at the points very much in the way of Lygodiums and Gleichenias; they grow to an indefinite length, and their stalks and rachis (stalk of the leafy portion), measuring sometimes 6ft. long, are covered with sharp thorns curved downwards; they are tripinnatifid (three times divided half-way to the midrib), and their lower leaflets, 1ft. to 1½ft. long, 4in. to 6in. broad, and somewhat spear-shaped, are divided into pinnules (leafits), which in their turn are cut into cuneate (wedge-shaped) segments, twice to four times lobed and bright green in colour. The small and cup-shaped sori (spore masses) are terminal. The plant is rendered very attractive by the slender stalks and the fresh growths being of a pale claret hue: these issue from a short, underground, creeping rhizome (prostrate stem), and make a beautiful pot specimen. This species may also be used with great advantage for covering a rustic pillar, or for climbing over rockwork, and should be either planted or potted in a more sandy or gritty compost than is used for most Davallias.—*Hooker*, *Species*

Filicum, i., p. 191, t. 54B. *Nicholson*, *Dictionary of Gardening*, iv., p. 530. *Lowe*, *Ferns British and Exotic*, viii., t. 26.

D. (Leucostegia) affinis—Leu-cos-teg′-ĭ-a ; af-fi′-nis (related), *Hooker*.

A handsome, finely-cut, stove species, usually found in gardens under the name of *Acrophorus*, native of Ceylon, Java, and Polynesia, and, according to Beddome, found in great abundance on the western slopes of the Neilgherries, at about 3000ft. elevation ; it is particularly well adapted for growing on rockwork, where it should be planted on projecting places. The elegantly-divided fronds, 1ft. to 2ft. long, 6in. to 12in. broad, and somewhat spear-shaped, are borne on strong, erect stalks 4in. to 9in. long, and tri- or quadri-pinnatifid (three or four times divided to the midrib) ; they are produced from thick prostrate stems (Fig. 24) that are densely clothed with sharp-pointed scales of a peculiar rusty colour. The ultimate segments of the fronds are deeply and finely pinnatifid (cleft nearly to the midrib), and are provided with sharp teeth. The small sori (spore masses) are disposed at the base of the teeth, two to six to a segment.—*Hooker*, *Species Filicum*, i., p. 158, t. 52B. *Nicholson*, *Dictionary of Gardening*, i., p. 445. *Beddome*, *Ferns of Southern India*, t. 158.

Fig. 24. Davallia affinis (much reduced).

D. alata—al-a′-ta (winged). Synonymous with *D. Emersoni*.

D. (Humata) alpina—Hum-a′-ta ; al-pi′-na (mountain-loving), *Blume*.

A charming little, stove species, of trailing, dwarf habit, native of Java, Borneo, and the Polynesian Islands, and totally distinct from all other kinds. Its fronds, which are abundantly produced from very slender and peculiarly

flattened rhizomes (prostrate stems), densely covered with scales of a light brown colour, are of two kinds. The barren ones, 2in. to 3in. long, and about 1½in. broad at their base, are triangular in outline; their upper segments, of a leathery texture, and of a dark shining-green colour, are broad and slightly toothed. The fertile fronds have their segments more finely divided, more distantly placed, and deeply and sharply toothed (Fig. 25), which characters give the plant a very elegant appearance. Both kinds of fronds are borne on slender stalks, 2in. to 4in. long, and have their rachis (stalk of the leafy portion) narrowly winged. The sori (spore masses) are placed in the teeth on both sides.—*Hooker*, *Species Filicum*, i., p. 154. *Nicholson*, *Dictionary of Gardening*, i., p. 445.

Fig. 25. Davallia alpina (½ nat. size).

To be grown to perfection, this little gem requires a warm temperature and moist atmosphere, although it is not partial to watering overhead. It succeeds remarkably well, and forms a very handsome little specimen, when grown on a pyramid of fibrous peat.

D. (Microlepia) amboynensis—Mi-crol-ep′-ĭ-a; am-boy-nen′-sis (from Amboyna), *Hooker*.

A stove species, native of Amboyna and the Moluccas, with fronds 9in. to 12in. long, spear-shaped, tripinnate (three times divided to the midrib), and borne on naked stalks 1ft. to 1½ft. long and of a dull brown colour. The leaflets are much larger at the base of the frond; the others are close, spear-shaped, and deeply pinnatifid (cut nearly to the midrib), with peculiarly ascending segments near the base, and on the inner side of which the sori (spore masses) are situated.—*Hooker*, *Species Filicum*, i., p. 178, t. 56c.

D. (Humata) angustata—Hum-a′-ta; an-gus-ta′-ta (narrow), *Wallich*.

This singular little, stove Fern, native of the Malayan Peninsula and Islands, and which Beddome says is also found growing on trees in Penang,

is one of the only two species known to have simple (undivided) fronds. These fronds are sessile (stalkless) or very shortly stalked, 3in. to 8in. long, ¼in. to ½in. broad, slightly and irregularly notched at the margin, and occasionally once forked. They are produced from a wide-creeping rhizome (prostrate stem) of a scaly nature; their texture is leathery, both their surfaces are naked, and the sori (spore masses) are disposed in a row along the edges. Fig. 26 is reduced from Col. Beddome's "Ferns of British India" by the kind permission of the author.—*Hooker*, *Species Filicum*, i., p. 152. *Nicholson*, *Dictionary of Gardening*, i., p. 455. *Beddome*, *Ferns of British India*, t. 237.

Fig. 26. Davallia angustata (½ nat. size).

D. (Leucostegia) assamica—Leu-cos-teg′-ĭ-a; as-sam′-ic-a (Assam), *Baker*.

This distinct, stove species, also known as *Acrophorus assamicus*, has spear-shaped, tripinnatifid fronds, 6in. to 12in. long, borne on naked stalks 1in. to 3in. long, and produced from a stout, wide-creeping rhizome (prostrate stem), densely clothed with large scales of a light brown colour. Their short-stalked leaflets and their crowded pinnules (leafits), of a somewhat leathery texture, have both surfaces naked. The sori (spore masses), disposed close to the margin of the ultimate lobes, are provided with involucres as broad as deep.—*Hooker*, *Synopsis Filicum*, p. 467. *Beddome*, *Ferns of British India*, t. 94.

D. (Stenoloma) bifida—Sten-ol-o′-ma; bif′-id-a (bifid), *Kaulfuss*.

A greenhouse species, of small dimensions, native of Minas Geraes and the Organ Mountains, Brazil. It has fronds 4in. to 8in. long, 2in. to 4in. broad, and quadripinnatifid (four times divided half-way to the midrib), borne on naked, wiry stalks 4in. to 8in. long, and produced from a short rhizome. The small and roundish sori (spore masses) are terminal on the pinnules (leafits), each of which is divided into two very narrow segments.—*Hooker*, *Species Filicum*, i., p. 188.

Hymenophyllum pulcherrimum

(½ nat. size).

D. (Odontoloma) Blumeana—Od-on-tol-o′-ma; Blu-mĕ-a′-na (Blume's), *Hooker.*

This very distinct and beautiful, stove species, native of the Philippine Islands, has fronds 8in. to 12in. long, 6in. to 8in. broad, bipinnate (twice divided to the midrib), borne on strong, erect stalks 4in. to 6in. long, and produced from a creeping rhizome (prostrate stem). The leaflets, 4in. to 6in. long and ½in. broad, are of a somewhat rigid nature and divided into pinnules (leafits) that are cut down on the upper side into filiform (thread-like) segments, either simple or forked, and on the enlarged extremities of which the small and roundish sori (spore masses) are situated.—*Hooker, Species Filicum*, i., p. 177, t. 54.

D. brachycarpa—brach-yc-ar′-pa (short-fruited). A variety of *D. gibberosa.*

D. (Odontoloma) brachypoda—Od-on-tol-o′-ma; brach-yp′-od-a (short-footed), *Baker.*

A very small, greenhouse species, with fronds 1in. to 1½in. long, strap-shaped, nearly stalkless, simply pinnate (only once divided to the midrib), and of a bright green colour. The sori (spore masses), disposed on the margins of the leaflets, are covered with involucres that are rather broader than deep. This species is found in a wild state on the banks of the Gilbert, North Australia.—*Hooker, Synopsis Filicum*, p. 468.

D. (Eudavallia) bullata—Eu-dav-al′-lĭ-a; bul-la′-ta (blistered), *Wallich.*

This handsome, deciduous, greenhouse species (see Coloured Plate), of medium growth, native of Japan, Java, and Hindostan, where it ascends to altitudes of 3000ft. to 4000ft., is popularly known as the "Squirrel's-foot Fern," from the general appearance of its creeping rhizomes (prostrate stems), which are invariably clothed with minute scales of a reddish-brown colour. The fronds, which are abundantly produced on these rhizomes, are 8in. to 12in. long, 4in. to 8in. broad, somewhat triangular, quadripinnatifid (four times divided half-way to the midrib), of a rich, dark shining green colour, of a leathery texture, and are borne on rather slender, yet firm, stalks 3in. to 4in. long. The deeply half-cup-shaped sori (spore masses) occupy the greater part of the tooth in which they are placed on the margin of the segments, and are usually provided with a horny projection on the outside.—*Hooker,*

Species Filicum, i., p. 169, t. 50B. *Nicholson*, *Dictionary of Gardening*, i., p. 445. *Lowe*, *Ferns British and Exotic*, viii., t. 28. *Beddome*, *Ferns of Southern India*, t. 17.

D. bullata is one of the most useful Davallias in cultivation, succeeding equally well in stove or greenhouse, and making a very fine specimen, whether grown in a shallow pan of good dimensions, in a hanging basket, on a pyramid of peat, or on a vertical piece of cork or Tree Fern stem, where the rhizomes have plenty of room for extension.

D. calvescens—cal-ves′-cens (bald, naked). Synonymous with *D. marginalis*.

Fig. 27. Davallia canariensis
(¼ nat. size).

D. (Eudavallia) canariensis—Eu-dav-al′-lĭ-a ; can-a′-rĭ-en-sis (from the Canaries), *Smith*.

This old favourite, probably the best known of all Davallias, and commonly called the "Hare's-foot Fern," derives its popular name from the peculiar nature of its prostrate stems (Fig. 27), which are stout, naturally creeping downwards, curving over the sides of the pot in which it grows,

and being covered with pale brown, narrow scales, much resemble a hare's foot. Its fronds, 1ft. to 1½ft. long, 9in. to 12in. broad, and borne on strong, erect stalks 4in. to 6in. long, are triangular and quadripinnatifid (four times divided half-way to the midrib); they are of a leathery texture and bright green in colour. The sori (spore masses), abundantly produced and covered by half-cup-shaped involucres, occupy the whole of the margin of the ultimate division on which they are disposed, and are usually provided with a horn extending beyond them.—*Hooker*, *Species Filicum*, i., p. 169, t. 56A. *Nicholson*, *Dictionary of Gardening*, i., p. 445. *Lowe*, *Ferns British and Exotic*, viii., t. 12.

The Hare's-foot Fern is a very ornamental and interesting Fern, useful for either pot or basket culture, or for planting on the rockwork. According to Lowe, it was introduced in the Royal Gardens, Kew, as long ago as 1669. Being a native of Madeira, the Canary Islands, Portugal, and North Africa, it succeeds well under greenhouse treatment; it is also an excellent Fern for the dwelling-room.

D. caudigera—cau-dig′-er-a (tail-bearing). Synonymous with *D. urophylla*.

D. (Leucostegia) chærophylla — Leu-cos-teg′-ĭ-a; chæ-roph-yl′-la (Chervil-leaved), *Wallich*.

This charming, delicate-looking, greenhouse Fern, frequently found in collections under the name of *Leucostegia pulchra*, is of a deciduous nature and a native of Ceylon, the Malayan Peninsula, Cashmere, the Neilgherries, and the North of India, ascending in the Himalayas to 10,000ft. elevation. Its spear-shaped fronds, 9in. to 15in. long, 4in. to 8in. broad, and tri- or quadripinnatifid (three or four times divided half-way to the midrib), are borne on slender, naked stalks 4in. to 6in. long, and produced on wide-creeping rhizomes (prostrate stems), generally running underground. They are of a thin, papery texture, and of a peculiar pale green colour, and their ultimate lobes, narrow and pointed in the fertile fronds, are rather broader and more blunt in the barren ones. The abundant sori (spore masses) are placed at the base of the teeth of the segments, which they about equal in breadth.—*Hooker*, *Species Filicum*, i., p. 157, t. 51A. *Nicholson*, *Dictionary of Gardening*, i., 445. *Lowe*, *Ferns British and Exotic*, viii., t. 13.

D. (Microlepia) ciliata—Mi-crol-ep′-ĭ-a ; cil-ĭ-a′-ta (ciliated or fringed with hairs), *Hooker.*

A very distinct, stove species, of medium growth, native of the Philippine Islands. Its fronds, 1ft. to 1½ft. long, 6in. to 9in. broad, spear-shaped and tripinnatifid (three times divided half-way to the midrib, are borne on firm, erect stalks 3in. to 4in. long, and of a hairy nature, and produced from a creeping rhizome (prostrate stem) that is densely covered with soft, brown hairs. They are of a thin, papery texture, and their under-surface, like the rachis (stalk of the leafy portion), is softly hairy. The very small sori are disposed two to twelve to a pinnule (leafit), and placed near the centre of the teeth near the base.—*Hooker*, *Species Filicum*, i., p. 184, t. 60A.

D. (Leucostegia) Clarkei—Leu-cos-teg′-ĭ-a ; Clar′-kĕ-i (Clarke's), *Baker.*

This greenhouse species, native of the Eastern Himalayas, where it is found at 10,000ft. elevation, is the *Acrophorus Hookeri* of Moore. It is of small dimensions ; its fronds, about 6in. long and borne on stalks of the same length, are deltoid (in shape of the Greek delta, Δ), tri- or quadripinnatifid (twice or three times divided half-way to the midrib), and of a bright green colour. The very small and round sori (spore masses), covered with pale involucres, broader than deep, and membranous (thin and more or less transparent), are disposed at the base of the ultimate lobes.—*Hooker*, *Synopsis Filicum*, p. 91.

D. (Prosaptia) contigua—Pros-ap′-tĭ-a ; con-tig′-ŭ-a (contiguous), *Swartz.*

A stove species, native of Ceylon, Java, and the Polynesian Islands, with tufted, sessile (stalkless) fronds 1ft. to 1½ft. long, 1½in. broad, narrowly spear-shaped, cut down nearly or quite to the rachis (stalk of the leafy portion) into numerous narrow-pointed or bluntish, slightly-toothed lobes of a leathery texture. The sori (spore masses), two to eight to a lobe, are disposed in the teeth on their upper part.—*Hooker*, *Species Filicum*, i., p. 161. *Beddome*, *Ferns of Southern India*, t. 19.

D. (Eudavallia) decurrens—Eu-dav-al′-lĭ-a ; de-cur′-rens (running down), *Hooker.*

A stove species, native of the Philippine Islands, resembling *D. divaricata* (*D. polyantha* of commerce), with fronds 1ft. to 2ft. long, and produced from

a stout, creeping rhizome (prostrate stem), but less finely divided than those of that popular species. The sori (spore masses), which fall short of the margin, are covered with half-cup-shaped involucres. — *Hooker*, *Species Filicum*, i., p. 167, t. 44B.

D. (Microlepia) Denhami — Mi-crol-ep′-ĭ-a ; Den-ham′-i (Denham's), *Hooker.*

An elegant, stove species, native of Fiji and Aneiteum, producing from a creeping rhizome fronds 1ft. to 2ft. long, borne on erect, slender stalks, 4in. to 8in. long. They are quadripinnatifid (four times divided half-way to the midrib), and of a thin, papery texture, with both surfaces naked. The very small and abundant sori (spore masses) are disposed not quite on the margin, and covered with half-cup-shaped involucres.—*Hooker*, *Second Century of Ferns*, t. 47.

D. (Eudavallia) dissecta—Eu-dav-al′-lĭ-a ; dis-sec′-ta (dissected), *J. Smith.*

This very beautiful and easily-cultivated, stove species, frequently found in gardens under the name of *D. elegans dissecta*, is a native of Java and the Malayan Archipelago, and one of the most extensively-grown species of *Davallia* for decorative purposes. Its fronds, produced in great abundance from a stout, wide-creeping rhizome (prostrate stem), clothed throughout with scales of a rusty colour, are 1ft. to 1½ft. long and deltoid (in shape of the Greek delta, Δ), being about as broad at the base as they are long, and four times pinnatifid (divided half-way to the midrib). They are of a light green tint, which contrasts agreeably with the colour of the rhizomes. The sori (spore masses), situated one on each of the ultimate segments of the fertile fronds, are small, oblong, and provided with one or two horns protruding beyond them.—*Hooker*, *Synopsis Filicum*, p. 469. *Nicholson*, *Dictionary of Gardening*, i., p. 445. *Lowe*, *Ferns British and Exotic*, viii., t. 20.

D. (Eudavallia) divaricata—Eu-dav-al′-lĭ-a ; di-va-ric-a′-ta (straggling), *Blume.*

This exceedingly handsome, strong-growing, stove species, native of Khasya, Northern India, the Malayan Peninsula, Java, &c., is generally found in commerce under the name of *D. polyantha*. Its beautiful fronds, 2ft. to 3ft.

long, are produced from thick, knotty rhizomes (prostrate stems), of a woody nature, and clothed with scales of a rusty colour ; they are tripinnatifid (three times divided nearly to the midrib), of a deep claret-red colour when young,

Fig. 28. Pinna of Davallia divaricata
(⅓ nat. size).

gradually changing to a bronzy or metallic colour, and then to a deep shining green ; the various hues, all of which are generally observable on the plant, have a beautiful and very pleasing appearance. The barren and fertile fronds, although of similar size and shape, are very different, the latter being very

finely divided through the contraction caused by the fructification. In each case the lower leaflets are often 1ft. long by 6in. broad ; they are of a leathery texture, and the half-cup-shaped sori (spore masses) are placed obliquely as regards the central veins in the teeth, at some distance from the edge.—*Hooker*, *Species Filicum*, i., p. 168, t. 59A. *Nicholson*, *Dictionary of Gardening*, i., p. 445. *Lowe*, *Ferns British and Exotic*, viii., t. 23. *Beddome*, *Ferns of British India*, t. 107.

The place that suits this species best is a projecting rock in the warm Fernery, where it can show itself in all its beauty. It is also a shallow-rooting plant, requiring but a few inches of soil to develop itself to perfection, and on that account can easily be grown on the trunk of a dead Tree Fern.

D. (Eudavallia) dubia—Eu-dav-al′-lĭ-a ; dub′-ĭ-a (doubtful), *R. Brown.*

The ample fronds of this greenhouse species, native of Australia, and also known as *Balantium Brownianum* of Presl and *Dicksonia dubia* of Gaudichaud, are deltoid (in shape of the Greek delta, Δ), and four times pinnatifid (cut half-way to the midrib). Their leaflets, 1ft. or more long, 2in. to 4in. broad, and of a rigid, leathery texture, have their stalked pinnules (leafits) close, wedge-shaped on their lower side at the base, and the oblong, stalkless segments smooth on their upper surface and slightly downy underneath. The small and numerous sori (spore masses) are situated one at the end of each final lobe, and show a small horn extending beyond them.—*Hooker*, *Species Filicum*, i., p. 71, t. 24c. *Nicholson*, *Dictionary of Gardening*, i., p. 445.

D. (Eudavallia) elegans—Eu-dav-al′-lĭ-a ; e′-leg-ans (elegant), *Swartz.*

A magnificent, vigorous-growing, stove species, native of Ceylon, the Malayan Peninsula, Java, Borneo, Madras, &c., and remarkable for the elegant divisions of its fronds, which are 1ft. to 2ft. long, 9in. to 15in. broad, deltoid (in shape of the Greek delta, Δ), three times cut nearly to the midrib, and of a bright shining green. These fronds are abundantly produced from a stout, wide-creeping rhizome (prostrate stem) densely clothed with woolly fibres ; the pinnules (leafits) of their lower leaflets are fully 3in. long, 1in. broad, and cut down into oblong segments which are slightly toothed, and of a leathery texture. The sori (spore masses), covered by half-cup-shaped involucres, are disposed several on the extremity of each segment, and have sharp teeth

projecting beyond them at the edges.—*Hooker*, *Species Filicum*, i., p. 164. *Nicholson*, *Dictionary of Gardening*, i., p. 445. *Lowe*, *Ferns British and Exotic*, viii., t. 22. *Beddome*, *Ferns of Southern India*, t. 18.

This handsome species has produced several varieties, the principal of which are described below :

D. e. dissecta—dis-sec′-ta (dissected). A garden name for *D. dissecta*.

D. e. elata—e-la′-ta (tall), *Swartz*.

A form with larger but less feathery fronds, the segments of which are narrower and more deeply and sharply cut.

D. e. polydactyla—pol-yd-ac′-tyl-a (having many fingers or divisions), *Moore*.

In its general aspect this garden variety resembles the typical form, and is as strikingly handsome as regards the dark glossy green of its substantial, long-enduring fronds ; but instead of the extremity of the frond itself, as well as the ends of the leaflets and of their pinnules (leafits), terminating in a narrow point like those of the species, they become dilated, and split down into several divisions, each of which is again divided several times, so that all the extremities are crested. It is very distinct, and the whole contour of the plant is extremely ornamental.—*Nicholson*, *Dictionary of Gardening*, iv., p. 530.

D. (Prosaptia) Emersoni — Pros-ap′-tĭ-a ; Em-er-so′-ni (Emerson's), *Hooker and Greville*.

This singular, stove species, which is the *D. alata* of Blume, is a native of Madras, Ceylon, Penang, Java, Borneo, and the Philippine Islands. Its tufted, sessile (stalkless) fronds are 6in. to 12in. long, nearly 1in. broad at their widest part, and of a coriaceous (leathery) texture. They are narrowly spear-shaped, and are cut more than half-way down to the rachis (stalk of the leafy portion) into numerous narrow-oblong or, at the lower part, triangular lobes, round the edge of which the sori (spore masses) are disposed from one to six together.—*Hooker and Greville*, *Icones Filicum*, t. 105. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Beddome*, *Ferns of Southern India*, t. 20.

D. (Eudavallia) epiphylla—Eu-dav-al′-lĭ-a ; ep-iph-yl′-la (upon a leaf), *Blume.*

A strong-growing, stove species, native of Java and the Malayan Peninsula, having foliage still more coriaceous (leathery) than in *D. elegans*, more finely-divided segments, very small spore masses, and sharp teeth protruded considerably beyond them.—*Hooker*, *Synopsis Filicum*, p. 96.

D. (Leucostegia) falcinella — Leu-cos-teg′-ĭ-a ; fal-cin-el′-la (finely hooked), *Presl.*

A stove species, native of the Philippine Islands, producing from a creeping rhizome (prostrate stem) thickly clothed with purplish-black, rigid hairs its triangular fronds ; these are 4in. to 6in. long, 3in. to 4in. broad, and three or four times divided half-way to the midrib, which is slightly winged. The leaflets are unequal-sided, and are divided into oblong pinnules (leafits), which are again deeply toothed ; the ultimate divisions of the fertile fronds are hooked and sharp-pointed, whereas those of the barren ones are broader and not so sharp. The sori (spore masses), two to six to a lobe, are placed at the base of the teeth.—*Hooker*, *Species Filicum*, i., p. 159.

D. (Stenoloma) ferruginea — Sten-ol-o′-ma ; fer-ru-gin′-ĕ-a (rusty), *Desvaux.*

This is a singular, stove species, native of Madagascar, which produces from an underground, slowly-creeping rhizome (prostrate stem) its long fronds of creeping or half-climbing habit, like those of *D. aculeata*, but the stalks of which are not prickly. These fronds are four times pinnatifid (cut nearly to the midrib), and the leafits of the lower leaflets, of a thin, papery texture, are 2in. to 3in. long ; their segments are wedge-shaped at the base and deeply toothed. The small and numerous sori (spore masses) are marginal, shallow, usually cup-shaped, sometimes as broad as the lobe in which they are placed, sometimes two running together.—*Hooker*, *Synopsis Filicum*, p. 102. *Nicholson*, *Dictionary of Gardening*, iv., p. 530.

D. (Leucostegia) ferulacea — Leu-cos-teg′-ĭ-a ; fer-ul-a′-cĕ-a (having leaves like Giant Fennel), *Moore.*

This pretty, stove species, also erroneously known as *D. trichomanoides* (which is totally different), is a native of the Fiji Islands. Its very finely-

divided fronds, of a thin, papery texture, are 9in. to 18in. long and 6in. to 9in. broad, and the sori (spore masses) are disposed at the enlarged extremities of their ultimate divisions.—*Hooker*, *Second Century of Ferns*, t. 64.

D. (Eudavallia) fijiensis—Eu-dav-al′-lĭ-a ; fi-ji-en′-sis (Fijian), *Hooker*.

This charming Fern — the most finely-divided species of the series to which it belongs—is, as its name implies, a native of the Fiji Islands, and requires stove temperature. It is remarkable through its thick rhizomes (prostrate stems), which somewhat resemble those of the common *D. canariensis*, but are usually straight. Its handsome fronds, although finely cut (Fig. 29), are firm and durable in texture ; they are borne on upright, strong stalks, 6in. to 9in. long, measure from 1ft. to 1½ft. in length and 6in. to 12in. in breadth, have a deltoid outline (in shape of the Greek delta, Δ), and are of a bright green colour ; they are gracefully deflexed and compound-divided, the whole frond being split up into lanceolate, almost linear pinnules (leafits), and finally cut into narrow-linear divisions. The half-cylindrical sori (spore masses) are terminal, being disposed on the extremities of the segments and sometimes provided with a slight wing, but no horn. This species is remarkably graceful in its whole contour, and, being of free growth and of evergreen habit, it must rank amongst the most ornamental of the whole genus.—*Hooker*, *Species Filicum*, i., p. 166, t. 55D. *Nicholson*, *Dictionary of Gardening*, i., p. 446.

Fig. 29. Davallia fijiensis (much reduced).

There are several more or less distinct varieties of *D. fijiensis* in cultivation, the most striking being the following :

D. f. major—ma′-jor (greater), *Moore.*

Although of much more robust growth than the species, this variety produces fronds equally as beautifully cut, though not so fine; they are borne on slender stalks, and are of a much lighter colour than those of the species, or of any other known form of it.

D. f. plumosa—plu-mo′-sa (feathery), *Bull.*

Perhaps one of the most elegant of all known Ferns, distinct from the species by the gracefully-drooping habit and the feathery nature of its pendulous fronds, as also by their much more finely-divided character. See Plate (for which we are indebted to Mr. Wm. Bull).—*Nicholson, Dictionary of Gardening*, iv., p. 530.

D. fijiensis and its various forms are all very useful as pot and basket plants, and very valuable for decorative purposes generally, making noble specimens, particularly adapted for exhibition. They are all averse to loam, a peaty compost of a sandy nature being that which suits them best.

D. firma—fir′-ma (firm). A synonym of *D. hirta.*

D. (Loxoscaphe) fœniculacea—Lox-os′-caph-e; fœ-nic-ul-a′-cĕ-a (Fennel-like), *Hooker.*

This decorative, stove species, native of the Fiji Islands, is very distinct: its habit, which is similar to that of *D. ferulacea*, much more resembles that of an Asplenium than a Davallia. The fronds, 9in. to 18in. long, 6in. to 12in. broad, and shortly spear-shaped, are produced from a single central crown, and borne on firm, erect stalks 6in. to 8in. long and of a particularly succulent nature; they are quadripinnate (four times divided to the midrib), the lower pinnules (leafits), spear-shaped, 2in. to 3in. long, and 1in. broad, being divided into segments of a fleshy texture, which in their turn are cut down to the rachis (stalk of the leafy portion) into simple or forked, linear (long and narrow) divisions. The sori (spore masses), which are disposed two to six to a segment, are deeply half-cup-shaped, and situated at the side of the segments. *D. fœniculacea* is increased only by spores, as it has no rhizomes, and seldom produces double crowns.—*Hooker, Second Century of Ferns*, t. 54. *Nicholson, Dictionary of Gardening*, iv., p. 530.

D. (Stenoloma) fumarioides—Sten-ol-o′-ma ; fu-ma′-rĭ-ŏ-i′-dēs (Fumaria-like), *Swartz.*

A stove species, native of the West Indies, and much resembling the better-known *D. aculeata*, as far as the rambling habit of its fronds and the prickly nature of their stalks are concerned ; but the segments are more deeply cut, and the lobes but slightly broader at their extremity than at their base. The cup-shaped sori (spore masses) are as broad as the segments, on the end of which they are situated.—*Hooker*, *Species Filicum*, i., p. 191. *Nicholson*, *Dictionary of Gardening*, i., p. 446.

D. Gaimardiana—Gai-mard-ĭ-a′-na (Gaimard's). A synonym of *D. parallela.*

D. (Loxoscaphe) gibberosa—Lox-os′-caph-e ; gib-ber-o′-sa (having gouty or swollen roots), *Swartz.*

A stove species, of large dimensions, native of the Polynesian Islands, and one which must not be confounded with *D. gibberosa* of gardens, which is simply a more or less constant, lax form of *D. canariensis.* In this plant the fronds, 1ft. to 1½ft. long, 6in. to 9in. broad, and borne on naked, upright stalks 6in. to 12in. long, are short-spear-shaped and four times pinnatifid (cut nearly down to the midrib) ; the pinnules (leafits) of the lower leaflets, of the same shape as the frond itself, are 2in. to 3in. long and 1in. broad ; they are of a soft, papery texture, and their segments are cut down to the rachis (stalk of the leafy portion) into long and very narrow or forked divisions. The sori (spore masses) are terminal in the ultimate divisions, and sometimes have a horn extending beyond them.—*Hooker*, *Species Filicum*, i., p. 192. *Nicholson*, *Dictionary of Gardening*, i., p. 446.

D. g. brachycarpa—brach-yc-ar′-pa (short-fruited), *Mettenius.*

A variety, native of the New Hebrides. Its sori (spore masses) are as broad as deep, and are overtopped by a long horn.—*Hooker*, *Synopsis Filicum*, p. 470. *Nicholson*, *Dictionary of Gardening*, iv., p. 531.

D. (Stenoloma) Goudotiana—Sten-ol-o′-ma ; Gou-do-tĭ-a′-na (Goudot's), *Kunze.*

A stove species, of small dimensions, native of Madagascar. Its slender, creeping rhizome (prostrate stem) produces linear-oblong fronds, 4in. to

6in. long and ½in. broad, on very short stalks. The largest leaflets are deltoid (in shape of the Greek delta, Δ), ½in. long, more than ¼in. broad, and cut down into simple or forked segments, each bearing at its summit a solitary nearly round sorus (spore mass).—*Hooker*, *Species Filicum*, i., p. 189, t. 50c.

D. (Eudavallia) Griffithiana—Eu-dav-al′-lĭ-a ; Grif-fith-ĭ-a′-na (Griffith's), *Hooker.*

This handsome species, which may be grown with equal success in either stove or greenhouse, is a native of Khasya, Assam, and Bhotan, also of the Malayan Peninsula and China. Its fronds, 9in. to 12in. long, 4in. to 8in. broad, and borne on erect, wiry stalks 4in. to 6in. long, are produced from stout, creeping rhizomes (prostrate stems), that are densely clothed with narrow, pale brown or whitish scales. They are of a leathery texture and three or four times pinnatifid (cleft nearly to the midrib), with their lower segments toothed on the barren fronds, but cut down nearly to the rachis (stalk of the leafy portion) in the fertile ones. Their sori (spore masses) are very large, cup-shaped, and disposed on the margins of the segments, with strong teeth projecting beyond them.—*Hooker*, *Species Filicum*, i., p. 168, t. 49B. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Beddome*, *Ferns of British India*, t. 106.

Fig. 30. Davallia heterophylla (⅓ nat. size).

D. hemiptera—he-mip′-ter-a (half-winged). Synonymous with *D. repens.*

D. (Humata) heterophylla — Hum-a′-ta ; het-er-oph-yl′-la (variable-leaved), *Smith.*

This very singular and pretty, stove species, is a native of the Malayan Peninsula and the Polynesian Islands. It and *D. angustata* are the only known Davallias with entire fronds. The fronds of *D. heterophylla* are produced from a small, creeping, scaly rhizome (prostrate stem) ; they are

3in. to 6in. long, 1in. broad, of a leathery texture, smooth on both surfaces, and shortly stalked ; the barren ones are spear-head-shaped, entire (undivided) or sometimes slightly lobed at the base, while the fertile ones are narrower and deeply notched (Fig. 30). The sori (spore masses) are disposed two to ten to a lobe.—*Hooker*, *Species Filicum*, i., p. 152. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Lowe*, *Ferns British and Exotic*, viii., t. 19. *Beddome*, *Ferns of British India*, t. 100.

This plant is particularly well adapted for growing on a Tree-Fern trunk, in which position it is shown to great advantage. When grown in a pan or pot it requires very little soil, as it is only a surface-rooting species.

D. (Microlepia) hirsuta—Mi-crol-ep′-ĭ-a ; hir-su′-ta (hairy), *Swartz.*

This very interesting and decorative, greenhouse species, native of Japan and Tsus-Sima, is totally distinct from all other Davallias through the colour, the texture, and the form of its handsome, narrow-spear-shaped fronds. These fronds, 6in. to 9in. long, 2in. broad, borne on slender, erect, hairy stalks 3in. to 4in. long, and abundantly produced from equally hairy, slender, creeping rhizomes (prostrate stems), are three times pinnatifid (cut nearly to the midrib). Their leaflets, of a soft, papery texture, are cut down to a broadly-winged rachis (stalk) into oblong, rather sharply-toothed lobes ; both surfaces are softly hairy. The sori (spore masses), disposed two to six to a segment, are situated in the teeth on the margin.—*Hooker*, *Second Century of Ferns*, t. 96 ; *Synopsis Filicum*, p. 98.

D. hirsuta is of great service wherever hanging baskets of moderate dimensions are required, few Ferns being better adapted for that purpose. Its narrowly-lanceolate fronds, of soft texture and pendulous habit, are very ornamental, especially when seen from below, their pellucid character being then shown off to advantage. Even the rhizomes are ornamental when trained round a basket, the long, shaggy, light brown hairs with which they are densely clothed rendering them interesting. The plant may also be grown with advantage in the rockery, but in that case it should be located on a prominent piece of rock where a comparatively large surface can be secured, to allow its rhizomes full development. The whole plant seldom measures more than about 1¼ft. in height, and is of a pleasing soft pale green colour throughout the year.

D. (Microlepia) hirta—Mi-crol-ep′-i-a ; hir′-ta (hairy), *Kaulfuss.*

This strong-growing, stove species, also known under the names of *D. firma* and *D. scaberula*, is a native of Ceylon and the Malayan and Polynesian Islands. Its handsome fronds, 3ft. to 6ft. long, 1ft. to 2ft. broad, and borne on strong, upright stalks 1ft. to 2ft. long, are three or four times pinnatifid (cleft nearly to the midrib). Their lower leaflets, 6in. to 12in. long and 3in. to 4in. broad, have spear-shaped pinnules (leafits), which are cut down to the rachis (stalk) into oblong, broadly-toothed lobes, each of these bearing from two to twenty spore masses disposed several together at the base of the teeth.—*Hooker*, *Species Filicum*, i., p. 181. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Beddome*, *Ferns of Southern India*, t. 256.

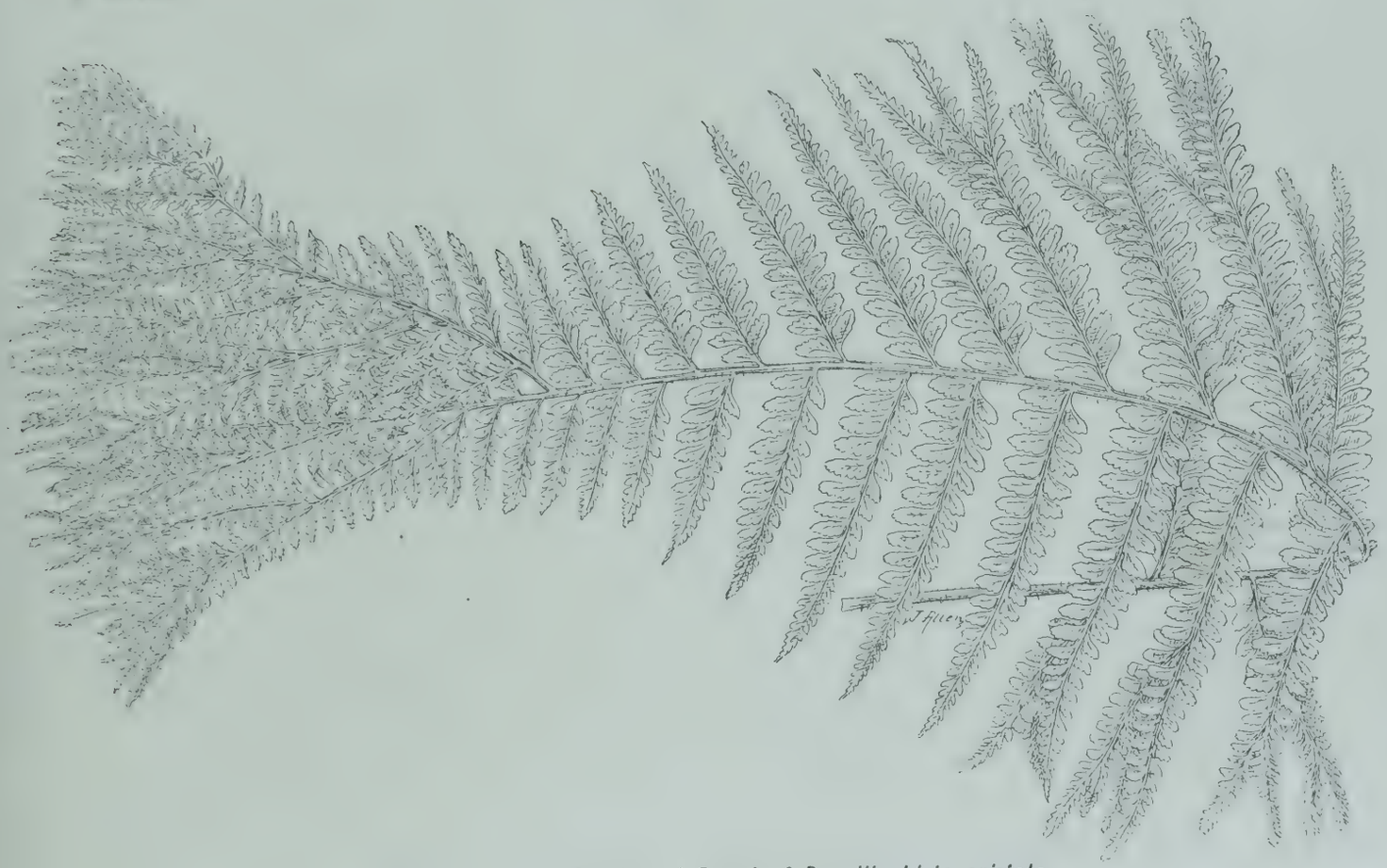


Fig. 31. Upper Portion of Frond of Davallia hirta cristata
(⅓ nat. size).

D. h. cristata—cris-ta′-ta (crested), *Moore.*

A fine, crested form, usually found in gardens under the name of *Microlepia hirta cristata.* It was introduced into this country from the South Sea Islands, and is greatly superior in decorative qualities to the original

species, being equally vigorous, but of a much more elegant, spreading habit. Its beautiful fronds, of a peculiarly soft light green colour, are produced in profusion from very short, creeping rhizomes (prostrate stems) having all the appearance of numerous crowns crowded together ; they are borne on stout yet flexible stalks, and attain fully 6ft. in length. These fronds not only differ from those of all other known species in having their extremity heavily tasselled, but even their leaflets are freely branched and subdivided near the summit, and the natural weight of these crests and tassels, and the much-divided pinnæ and pinnules, give the whole plant a very attractive appearance by producing a gradual and graceful curve of the stalks.—*Nicholson*, *Dictionary of Gardening*, iv., p. 531.

D. h. cristata is one of the strong-growing Davallias which should for preference be grown in fibrous peat and sand only ; it is also one of those which suffer most from insufficiency of water at the roots at any time of the year. The whole plant is slightly hairy, and on that account should never be watered overhead. Another peculiarity of this truly noble form is that, although plants 10ft. to 12ft. through are frequently seen in horticultural shows, it very seldom produces fertile fronds, so that it is generally increased by the division of the crowns, an operation attended with the greatest success when performed in the early part of the year.

D. Hookeri—Hook′-er-i (Hooker's). Synonymous with *D. Clarkei*.

D. (Microlepia) Hookeriana—Mi-crol-ep′-ĭ-a ; Hook-er-ĭ-a′-na (Hooker's), *Wallich*.

A stove species, of medium growth, native of Sylhet and the Khasya Hills, also of Assam and Hong-Kong. Its fronds, 1ft. to 1½ft. long and 6in. to 8in. broad, are produced from a hairy, creeping rhizome (prostrate stem), and borne on stout, upright stalks 4in. to 6in. long. They are simply pinnate (only once divided to the midrib), and their largest leaflets, 4in. long and ½in. broad, are auricled (eared) at the base above, slightly undulated below, and toothed towards their extremity ; the texture is somewhat leathery. The sori (spore masses) are disposed in continuous rows along the edges of the leaflets, and are covered by small involucres about as broad as deep.—*Hooker*, *Species Filicum*, i., p. 172, t. 47B. *Beddome*, *Ferns of British India*, t. 101.

D. (Leucostegia) hymenophylla—Leu-cos-teg′-ĭ-a ; hym-en-oph-yl′-la (membranous-leaved), *Baker.*

This very pretty, stove species, also known under the name of *Acrophorus hymenophyllus*, is a native of Moulmein, where it grows on limestone rocks. It is a very distinct Fern, with fronds of a flaccid nature, 6in. to 9in. long, 4in. to 6in. broad, borne on slender stalks 3in. to 4in. long, and produced from a thin, creeping rhizome (prostrate stem). They are deltoid (in shape of the Greek delta, Δ), with leaflets distant, the lowest pair broadest and most deeply cut on the lower side, and their pinnules (leafits), or at least the lowest of them, reaching down nearly to the rachis (stalk of the leafy portion), toothed more than half-way down, with oblong, blunt, dented lobes. The sparingly-produced sori (spore masses) are disposed in the notches on the margin.—*Hooker*, *Synopsis Filicum*, p. 90. *Beddome*, *Ferns of British India*, t. 96.

D. (Odontoloma) hymenophylloides—Od-on-tol-o′-ma ; hym-en-oph-yl-lŏ-i′-dēs (Hymenophyllum-like), *Baker.*

A very singular and pretty, stove Fern, native of Java and New Caledonia, with fronds sub-sessile (almost stalkless), simply pinnate (only once divided to the midrib), and much resembling those of *D. repens* (*D. hemiptera* of gardens), but with more deeply-cut leaflets ; these organs being of a thin, papery texture, and cut down into narrow, simple or forked segments, on the margin of which the nearly globular spore masses are disposed.—*Hooker*, *Synopsis Filicum*, p. 93.

D. (Leucostegia) immersa—Leu-cos-teg′-ĭ-a ; im-mer′-sa (immersed), *Wallich.*

This is a distinct, deciduous, greenhouse species, native of Hindostan and the Malayan Peninsula, and, according to Beddome, ascending on the Himalayas to an altitude of 8000ft. Its elegant fronds, 1ft. to 1½ft. long, 6in. to 9in. broad, and borne on strong, upright stalks 4in. to 8in. long, are deltoid (in shape of the Greek delta, Δ) and three times divided to the midrib ; they are of a pale green colour, of a papery texture, and their lower leaflets, 2in. to 3in. long, are again divided into segments which are obliquely truncate at the base below, and roundly lobed, with the lobes again notched, above. The

comparatively large sori (spore masses) are disposed one to six to a segment. —*Hooker*, *Species Filicum*, i., p. 156. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Lowe*, *Ferns British and Exotic*, viii., t. 15. *Beddome*, *Ferns of Southern India*, t. 11.

Although a deciduous species, *D. immersa* is one which well deserves a place in every collection, as it makes during the summer months a very handsome specimen when grown in a basket. This seems, indeed, the best way to grow it, as its rhizomes (prostrate stems), which are somewhat slender, are usually developed beneath the surface of the soil.

D. (Humata) Imrayana—Hum-a′-ta ; Im-ray-a′-na (Imray's), *Hooker*.

A stove species, of small or medium dimensions, native of the West Indian Islands, Guadeloupe, and Dominica. Its fronds, 6in. to 12in. long and 4in. to 6in. broad, are borne on brown or black stalks, 4in. to 8in. long and upright ; they are egg-shaped in outline and simply pinnate (only once divided to the midrib) ; their largest leaflets, about 3in. long and 1in. broad, of a thin, papery texture, are spear-shaped, provided with broad, blunt teeth, somewhat unequal-sided, and obliquely truncate at the base below. The sori (spore masses), which are covered by rounded involucres that are broader than deep and attached by the base only, are placed in the teeth at a short distance from the margin.—*Hooker*, *Species Filicum*, i., p. 171, t. 49A.

D. khasyana—khas-ў-a′-na (Khasyan). Synonymous with *D. strigosa*.

D. (Stenoloma) Lenormandi — Sten-ol-o′-ma ; Len-or′-mand-i (Lenormand's), *Baker*.

A stove species, of small dimensions, native of New Caledonia. It is provided with firm, wide-creeping rhizomes (prostrate stems), from which triangular fronds 4in. to 5in. long and four times pinnatifid (cleft nearly to the midrib) are produced : these fronds are borne on naked stalks 6in. to 12in. long, and have both surfaces of an even green colour. The minute, terminal sori (spore masses) are free or narrowly edged on both sides.—*Hooker*, *Synopsis Filicum*, p. 471.

D. Lindleyi—Lind′-ley-i (Lindley's). This is a synonym for the well-known *D. solida*.

D. (Eudavallia) Lobbiana—Eu-dav-al′-lĭ-a ; Lob-bĭ-a′-na (Lobb's), *Moore*.

This stove species, of medium growth, is a native of Borneo. Its fronds are spear-shaped, twice or three times pinnatifid (cut nearly to the midrib), 1ft. to 1½ft. long, 6in. to 9in. broad, and provided with a rachis (stalk of the leafy portion) that is slightly winged above. Their lower leaflets, 4in. to 6in. long and 2in. broad, are cut down to the rachis into blunt segments, only the lowest of which are deeply toothed. The abundant sori (spore masses) are placed obliquely in two long rows on the pinnules (leafits) near the edge, and covered by involucres that are broader than deep.—*Moore*, *Index Filicum*, p. 206.

D. lonchitidea—lonch-it-id′-ĕ-a (Lonchitis-like). A garden synonym for *D. platyphylla*.

D. (Eudavallia) Lorrainii—Eu-dav-al′-lĭ-a ; Lor-rain′-ĭ-i (Lorrain's), *Hance*.

A stove species, native of the Malayan Peninsula, producing from a rhizome (prostrate stem) as thick as a quill, and covered with nearly black scales, triangular fronds, 6in. to 12in. long, borne on naked, brownish stalks 3in. to 4in. long. These fronds are four times pinnatifid (cleft nearly to the midrib) ; their final lobes are ligulate (strap-shaped), of a somewhat leathery texture, and have each a sorus (spore mass) disposed at their base on the inner side. —*Hooker*, *Synopsis Filicum*, p. 469. *Nicholson*, *Dictionary of Gardening*, iv., p. 531.

D. (Microlepia) majuscula—Mi-crol-ep′-ĭ-a ; ma-jus′-cul-a (rather large), *Lowe*.

A strong-growing, stove species, native of Ceylon, with fronds of a somewhat leathery texture and pale green colour, 2ft. to 3ft. long, borne on erect, naked stalks 6in. to 12in. long, and produced from stout, creeping rhizomes (prostrate stems), that are densely covered with silky whitish hairs. The lower leaflets, 9in. to 12in. long and 3in. to 4in. broad, are spear-shaped, and divided into pinnules (leafits) of similar form cut down nearly or quite to the rachis (stalk) into blunt, slightly-notched, oblong lobes. The small and abundant sori (spore masses) are disposed from two to twelve to a segment, and are situated at the base of each lobe.—*Hooker*, *Species Filicum*, p. 99. *Lowe*, *Ferns British and Exotic*, viii., t. 33.

D. (Stenoloma) Mannii—Sten-ol-o′-ma ; Man′-nĭ-i (Mann's), *Eaton.*

This singular, pretty, stove species, native of the Sandwich Islands, has spear-shaped fronds, 1ft. or more in length, 2in. to 2½in. broad, narrowed from the middle to summit and base, and three times pinnatifid (cleft nearly to the midrib). The closely-set, oblong, spear-shaped, nearly stalkless leaflets are divided into ascending pinnules (leafits), the upper ones of which are simple or forked, and the lower ones pinnatifid, with distant, strap-shaped segments. The sori (spore masses) are usually terminal, free, and twice as broad as the tip of the segment.—*Hooker*, *Synopsis Filicum*, p. 471.

D. (Microlepia) marginalis—Mi-crol-ep′-ĭ-a ; mar-gin-a′-lis (marginal), *Baker.*

This very distinct, nearly deciduous, greenhouse species, native of the Himalayas, Japan, and China, and also known in gardens under the names of *D. calvescens*, *D. scabra* and *D. villosa*, is a very interesting plant. Its fronds, 1½ft. to 2ft. long and 9in. to 15in. broad, are simply pinnate (only once divided to the midrib) and borne on upright, slender stalks 1ft. to 2ft. long. Their pinnæ (leaflets), 4in. to 8in. long and about 1in. broad, are cut down about half-way to the rachis (stalk) into bluntish, oblong lobes ; they are of a somewhat leathery texture, and the nearly marginal sori (spore masses) are disposed two to eight to a lobe.—*Hooker*, *Species Filicum*, i., p. 172, t. 48A. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Beddome*, *Ferns of British India*, t. 102.

D. marginalis is thoroughly distinct in appearance from any other Davallia in cultivation, and deserves a place in all good collections, inasmuch as it makes a very pretty object when grown in a basket, the cheerful, light green colour of its fronds forming a very pleasing contrast with the reddish hue of the slender stalks on which they are borne ; they are abundantly produced from thick, underground rhizomes (prostrate stems) of a scaly nature, and have a gracefully-arching habit.

D. (Eudavallia) Mariesii—Eu-dav-al′-lĭ-a ; Ma-ries′-ĭ-i (Maries's), *Moore.*

An elegant, deciduous, greenhouse species, of dwarf habit and very free growth ; it is a native of Japan, where it is very extensively used for decoration. In general aspect it is not unlike the well-known *D. bullata*, but

it is more slender in all its parts. The graceful fronds, of an elongated-triangular shape, 8in. to 12in. long and 4in. to 8in. broad, are borne on naked, slender, flexible stalks 3in. to 4in. long, and produced from slender, wide-creeping rhizomes (prostrate stems) of a peculiar grey colour ; they are four times pinnatifid (cut nearly to the midrib), with the pinnules (leafits) of the lower leaflets spear-shaped, and deeply cut into oblong segments (Fig. 32).

Fig. 32. Frond of Davallia Mariesii
(½ nat. size).

The sori (spore masses), disposed at the extremity of the segments, are deeply half-cup-shaped.—*Nicholson, Dictionary of Gardening*, i., p. 446.

As a basket Fern, *D. Mariesii* is one of the best of the genus ; its rhizomes, of a very slender and flexible nature, readily take possession of the whole exterior surface of the basket, and peep out in all directions. It is extensively used in Japan for forming boats, wreaths, crosses, and other designs, to which purpose its flexible rhizomes readily lend themselves.

D. M. cristata—cris-ta′-ta (crested), *Moore.*

This is a prettily-crested, garden variety of the foregoing species, rendered still more elegant by the tasselled extremities of the fronds, which have retained their normal size, and of their leaflets. It is extremely attractive when cultivated in a suspended basket, over which its flexuose rhizomes (bending, prostrate stems) creep freely in every direction, the weight of the tassels helping to show to perfection the grace of its arching fronds.

D. (Eudavallia) mauritiana—Eu-dav-al′-lĭ-a ; mau-rit-ĭ-a′-na (native of Mauritius), *Hooker.*

A strong-growing, finely-divided, stove species, with triangular fronds 1ft. to 2ft. long, 1ft. to 1¼ft. broad, and four times pinnatifid (cut nearly to the midrib). The main rachis (stalk of the leafy portion) is slightly winged above; the ultimate pinnules (leafits), 3in. to 4in. long, 2in. broad, and of a leathery texture, are cut down to the rachis in the lower part with deeply-incised lobes. The abundant sori (spore masses) are disposed in the teeth of the ultimate segments.—*Hooker, Species Filicum*, i., p. 164, t. 55B.

D. (Stenoloma) meifolia—Sten-ol-o′-ma ; me-if-ol′-ĭ-a (Meum or Spignel-leaved), *Humboldt, Bonpland, and Kunth.*

A very pretty, delicate-looking, stove species, of small dimensions, native of the Amazon Valley, and having spear-shaped fronds seldom more than 4in. long, produced from a short-creeping rhizome (prostrate stem), and borne on naked, slender, erect stalks 2in. to 12in. long. The leaflets, which are also spear-shaped, and about 1in. long, have spreading pinnules (leafits), of a somewhat leathery texture, and these are again divided into ligulate (strap-shaped) segments, on the extremities of which the cup-shaped spore masses are disposed.—*Hooker, Species Filicum*, i., p. 189.

D. (Leucostegia) membranulosa—Leu-cos-teg′-ĭ-a ; mem-bra-nul-o′-sa (thin and transparent), *Wallich.*

A greenhouse species, native of the Himalayas, Kumaon, and Bhotan. Its fronds are of a very thin, papery texture, 6in. to 9in. long, 2in. to 3in. broad, borne on stalks 2in. to 3in. long, and produced from wide-creeping, stout rhizomes (prostrate stems) densely clothed with spear-shaped scales of a pale

brown colour. They are once fully pinnate, but their lower leaflets are cut down into numerous sharply-toothed, oblong segments, each of which bears two to eight spore masses obliquely placed between the midvein and the margin.—*Hooker*, *Species Filicum*, i., p. 159, t. 53A. *Beddome*, *Ferns of British India*, t. 98.

D. (Microlepia) moluccana—Mi-crol-ep′-ĭ-a ; mol-uc-ca′-na (from the Moluccas), *Blume.*

This is a very robust, stove species, native of the Malayan, Philippine, and Polynesian Islands. Its triangular fronds, 2ft. to 3ft. long, 1ft. to 1½ft. broad, and borne on strong, erect stalks 1ft. high, are four times pinnatifid (cut nearly to the midrib) ; they are of a somewhat leathery texture, and the ultimate segments of their pinnules (leafits) are cut into broadly-toothed, oblong lobes, each of which bears from one to six small spore masses in the teeth.—*Hooker*, *Species Filicum*, i., p. 180, t. 58A.

D. Mooreana—Moor-ĕ-a′-na (Moore's). The most popular name for *D. pallida.*

D. (Eudavallia) Moorei—Eu-dav-al′-lĭ-a ; Moor′-ĕ-i (Moore's), *Hooker.*

A small-growing, stove species, discovered by Mr. Charles Moore, in New Caledonia. Its fronds are 4in. to 6in. long and 3in. to 4in. broad, their lowest leaflets being cut down into bluntly-toothed, oblong lobes of a leathery texture. The sori (spore masses), which are produced four to six to a lobe, are placed in the teeth at a little distance from the edge, and covered by half-cup-shaped involucres.—*Hooker*, *Second Century of Ferns*, t. 53.

D. (Leucostegia) multidentata — Leu-cos-teg′-ĭ-a ; mul-tid-en-ta′-ta (many times toothed), *Hooker.*

A strong-growing, greenhouse species, native of the Sikkim Himalayas (where it is found at elevations of 5000ft. to 7000ft.), Assam, &c. Beddome, who figures a plant of it from the Khasya Hills, says : "It is a delicate, finely-cut species with much the appearance of *Asplenium tenuifolium*, easier understood from the figure than by description." Its fronds, 2ft. to 3ft. long and 1ft. broad, are bipinnate (twice divided to the midrib) ; they are of a soft, papery texture, and the pinnules (leafits) of the lower leaflets are cut

into egg-shaped segments, each of which bears two to twelve spore masses at the base of its teeth on the upper side of the central vein.—*Hooker*, *Synopsis Filicum*, p. 91. *Beddome*, *Ferns of British India*, t. 95.

D. (Loxoscaphe) nigrescens—Lox-os′-caph-e ; nig-res′-cens (blackish), *Hooker.*

A stove species, of medium growth, somewhat resembling *D. gibberosa*, but having pinnules (leafits) shorter and more divided, with flatter segments and hairy rachises (stalks of the leafy portion of the fronds). It is a native of Fernando Po, where it grows at an elevation of 3000ft.—*Hooker*, *Synopsis Filicum*, p. 101.

D. (Leucostegia) nodosa—Leu-cos-teg′-ĭ-a ; no-do′-sa (knotted), *Hooker.*

This very strong-growing, greenhouse species, native of North Hindostan, and ascending in Sikkim to 10,000ft. elevation, has fronds 2ft. to 4ft. long, quadripinnate (four times divided to the midrib), borne on strong, upright stalks 1ft. to 2ft. long and scaly below. The lower leaflets, 1ft. to 1½ft. long and 6in. to 9in. broad, are cut into pinnules (leafits), which in their turn are divided into segments cut down to the rachis (stalk) into small, rather bluntly-toothed lobes. The sori (spore masses), one to four to a lobe, are placed between the midvein and the margin.—*Hooker*, *Species Filicum*, i., p. 157. *Beddome*, *Ferns of British India*, t. 93.

D. (Leucostegia) novæ-zelandiæ—Leu-cos-teg′-ĭ-a ; nov′-æ–ze-land′-ĭ-æ (from New Zealand), *Colenso.*

This exceedingly beautiful, greenhouse Fern, native of New Zealand, is more generally known under the name of *Acrophorus hispidus.* It almost equals some of the Filmy Ferns in beauty, and should be extensively grown, as it makes a very pretty object on the rockwork, in the fissures of which it becomes quite at home. The fronds, 1ft. to 1½ft. long, 4in. to 8in. broad, triangular, and tripinnate (three times divided to the midrib), are produced from a slender, creeping rhizome (prostrate stem) clothed with ferruginous (rust-coloured) hairs, which are soft and jointed ; they are of a brownish-green colour, glossy, of a somewhat leathery texture, and borne on firm, erect stalks of a mahogany-brown colour, and from 4in. to 8in. long. The lower

pinnules (leafits) are cut down to the rachis (stalk of the leafy portion), except towards their extremity, into narrow, deeply-pinnatifid segments, on the teeth of which the minute and numerous spore masses are disposed. The rhizomes, which are of a peculiarly wiry nature, do not bury themselves in the ground.—*Hooker*, *Species Filicum*, i., p. 158, t. 51B. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Lowe*, *Ferns British and Exotic*, viii., t. 16.

D. ornata—or-na′-ta (ornamental). A form of *D. solida*.

D. (Eudavallia) pallida—Eu-dav-al′-lĭ-a ; pal′-lid-a (pale), *Mettenius*.

This beautiful, stove species (see Plate), native of Aneiteum and Borneo, and usually known as *D. Mooreana*, is undoubtedly one of the handsomest decorative Ferns known. Its robust fronds, of an elongated-triangular form, 2ft. to 3ft. long, and four times pinnatifid (cut nearly to the midrib), are produced on rhizomes (prostrate stems) as thick as one's finger, wide-creeping, and covered with spear-shaped scales of a dark brown colour ; they are borne on smooth, naked stalks 1ft. to 1½ft. long, and furnished with triangular leaflets, the lowest, which usually are also the largest, frequently measuring 6in. to 8in. broad at their base. The pinnules (leafits) and their segments are stalked and wedge-shaped at their base ; they are of a firm and somewhat leathery texture, the lobes into which they are finally divided, and upon which the spore masses are disposed on the upper side at the base, being blunt and wedge-shaped. — *Hooker*, *Synopsis Filicum*, p. 469. *Nicholson*, *Dictionary of Gardening*, i., p. 446.

In a young state *D. pallida* has a great resemblance to *D. immersa*, from which it is, however, easily distinguished by the involucre (covering) of its spore masses, which is marginal, funnel-shaped, and deep, also by its evergreen character. When fully developed, there cannot possibly be any confusion between the two plants, the size and division of their fronds, as well as their texture, being totally different. That the merits of *D. pallida* are fully appreciated by Fern-growers in general, is amply demonstrated by the fact that huge specimens of it are to be seen at all flower shows, for which purpose it is admirably adapted. It is a Fern of rapid growth, possessing the great advantage, from the decorator's point of view, of making a large specimen in a comparatively small pot. The delightful pale green colour of its fronds also renders the plant very attractive.

D. (Humata) parallela—Hum-a′-ta ; par-al-le′-la (parallel), *Wallich.*

A stove species, of small dimensions, native of the Malayan Peninsula and the Polynesian Islands. Its fronds, 4in. to 8in. long and 1½in. to 2in. broad, are produced from a creeping, scaly rhizome (prostrate stem), and borne on erect stalks 2in. to 4in. long and more or less scaly ; they are of a leathery texture, in habit and size resembling those of our common *Polypodium vulgare*, and are cut down nearly or quite to the rachis (stalk of the leafy portion) into long, parallel, entire, bluntish lobes, the lowest pair sometimes auricled (eared) at the base. The sori (spore masses) are oblique and disposed in two rows in the lobes, where they occupy the greater part of the space between the midvein and the margin. *D. Gaimardiana* is another name for this species. Fig. 33 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker, Species Filicum*, i., p. 153, t. 42A. *Beddome, Ferns of British India*, t. 99.

Fig. 33. Davallia parallela
(⅓ nat. size).

D. (Odontoloma) Parkeri—Od-on-tol-o′-ma ; Par′-ker-i (Parker's), *Hooker.*

This is a stove species, native of British Guiana, which, from a slender, creeping rhizome (prostrate stem), produces simple or branched fronds of a soft, papery texture, and borne on flexuose, wiry, naked stalks 2in. to 6in. long. These fronds have one or two pairs of lateral leaflets ; their pinnules (leafits), in the shape of a quarter of a circle, are about ½in. broad, ¼in. deep, and have their outer edge slightly notched. The sori (spore masses) are small, nearly marginal, and covered by involucres that are rather broader than deep.—*Hooker, Species Filicum*, i., p. 176, t. 53.

D. (Leucostegia) parvula—Leu-cos-teg′-ĭ-a ; par′-vul-a (little), *Wallich.*

This exceedingly pretty, dwarf-growing, stove Fern—by Mettenius placed in *Humata*, with which it quite agrees in habit—is a native of the islands of

Java, Borneo, and Singapore, where some trees have their trunks literally covered with it. Its little fronds, deltoid in outline (in shape of the Greek delta, Δ), seldom exceed 1in. long and ½in. broad (Fig. 34). They are produced from a slender, scaly rhizome (prostrate stem), and are borne on smooth stalks ½in. to 1in. long; they are bi- or tripinnate (twice or three times divided to the midrib), with all their divisions almost filiform (thread-like) and the ultimate segments sharp at the point. The sori (spore masses) are placed at the sinuses (openings) of the ultimate forks, and are covered by involucres that are broader than the segments.—*Hooker*, *Species Filicum*, i., p. 160. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Beddome*, *Ferns of British India*, t. 97.

Fig. 34. Davallia parvula (nat. size).

Although it grows only a few inches high, *D. parvula*, with its small, dark green fronds of a very leathery texture, is a general favourite amongst lovers of plants which are attractive either through some peculiar conformation or simply on account of the neatness of their habit. To be grown to perfection, this exquisite little gem requires only a very shallow pan, great care being taken to keep the whole of the rhizomes above ground. It also forms very pretty objects when grown on a Tree-Fern trunk, or on imitations of trunks made of sphagnum moss tightly bound together.

D. (Humata) pectinata—Hum-a′-ta; pec-tin-a′-ta (comb-like), *Smith.*

A stove species, of small dimensions, native of the Tropical Polynesian Islands. It produces, from a creeping, scaly rhizome (prostrate stem), spear-shaped fronds 4in. to 8in. long and 2in. to 3in. broad, which are borne on upright stalks 2in. to 4in. long and of a more or less scaly nature. They are cut down nearly or quite to the rachis (stalk of the leafy portion) into parallel, linear-oblong leaflets of a leathery texture, the lowest pair deeply pinnatifid (cut nearly to the midrib) on the lower side, with lobes sometimes ½in. long. The sori (spore masses) are obliquely placed in two sub-marginal rows.—*Hooker*, *Species Filicum*, i., p. 153. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Hooker and Greville*, *Icones Filicum*, t. 139.

D. (Humata) pedata — Hum-a′-ta ; ped-a′-ta (footed, or having feet), *Smith.*

This distinct, stove species, which, though of larger dimensions, may be said to somewhat resemble *D. alpina*, is a native of Ceylon, Java, Borneo, the Mascarene Islands, &c. Its triangular fronds, which are of a very leathery texture, 2in. to 4in. long, and 1½in. to 2in. broad at the base, are borne on stalks 2in. to 4in. long and of a somewhat scaly nature. They are pinnatifid (cut down nearly to the stalk), their upper segments being sharp-pointed, the lower pair broader, deeply cleft, especially on the lower side. The spore masses are placed in rows on the teeth on both sides of the lobes.—*Hooker*, *Species Filicum*, i., p. 54, t. 45. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Lowe*, *Ferns British and Exotic*, viii., t. 25.

D. (Scyphularia) pentaphylla—Scyph-ul-a′-rĭ-a ; pent-aph-yl′-la (five-leaved), *Blume.*

A very distinct, dwarf-growing, stove species, native of Java and the Polynesian Islands, and one of the very few Davallias with fronds simply pinnate (only once divided to the midrib). These fronds are produced from a rhizome (prostrate stem) of medium thickness, densely covered with narrow scales of a particularly light brown colour ; they are borne on upright, stiff stalks 2in. to 4in. long, and are composed of two or three pairs of lateral leaflets and a terminal one, all of which in their young state are of a very pretty metallic colour, turning with age to a pleasing green. The whole frond, including the stalk, is seldom more than 1ft. long ; the terminal leaflet in the fertile frond measures about 4in. long and ½in. broad, while that of the barren frond is shorter and broader. The lateral leaflets are sessile (stalkless) or slightly stalked, of a leathery texture, the lowest pair showing sometimes a smaller pinnule (leafit) at the base. The sori (spore masses) are disposed in a row along the slightly-toothed margin. This species is of very easy culture, and makes a handsome basket plant. It is also adapted for growing in a Fern-case.—*Hooker*, *Species Filicum*, i., p. 163. *Nicholson*, *Dictionary of Gardening*, i., p. 446. *Lowe*, *Ferns British and Exotic*, viii., t. 18.

D. (Microlepia) pinnata—Mi-crol-ep′-ĭ-a ; pin-na′-ta (pinnate), *Cavanilles.*

This is also a stove species, native of Java and the Polynesian Islands. Its fronds, of a leathery texture, are simply pinnate (once divided to the

midrib); they are from 9in. to 15in. long, 4in. to 8in. broad, and borne on strong, upright stalks 6in. to 12in. long; they are furnished with distant, linear (very narrow) and slightly-toothed leaflets 6in. long, ¼in. to ½in. broad, in each tooth of which the small and nearly marginal sori (spore masses) are disposed.—*Hooker*, *Species Filicum*, i., p. 173, t. 60. *Nicholson*, *Dictionary of Gardening*, i., p. 446.

D. (Microlepia) platyphylla — Mi-crol-ep′-ĭ-a; plat-yph-yl′-la (broad-leaved), *Don.*

A very handsome, robust-growing, greenhouse, evergreen species, found wild throughout Hindostan, from Ceylon to the Himalayas; it is a very distinct Fern, frequently met with in gardens under the name of *D. lonchitidea*. The massive fronds, 3ft. to 4ft. long and sometimes 2½ft. broad at the base, are borne on firm, upright stalks 2ft. to 3ft. long; they are of a somewhat leathery texture and glaucous-green in colour. The lower leaflets, 1ft. to 1¼ft. long, 6in. to 8in. broad, and spear-shaped, are furnished with distinct pinnules (leafits) of the same shape, and cut nearly to the stalk below into broad, bluntish, toothed, oblong lobes. The very conspicuous sori (spore masses) are placed one in each tooth, at a short distance from the edge.—*Hooker*, *Species Filicum*, i., p. 173, t. 46B. *Nicholson*, *Dictionary of Gardening*, i., p. 447. *Lowe*, *Ferns British and Exotic*, viii., t. 30.

D. platyphylla makes an exceedingly handsome specimen when grown in a pot, but it progresses still more rapidly when planted in a substantial compost in the rockery, where an abundance of water can be allowed it during the summer. Its robust fronds, produced from an underground rhizome (prostrate stem) of a very fleshy nature, have their under-surface rendered very attractive by the large, conspicuous sori of a bright reddish-brown colour, contrasting singularly with the pale bluish hue which pervades the whole of the plant.

D. polyantha — pol-ў-an′-tha (many-fruited). A common garden name for *D. divaricata.*

D. polydactyla—pol-yd-ac′-tyl-a (many-fingered). A form of *D. elegans.*

D. polypodioides—pol-yp-od-ĭ-ŏ-i′-dēs (Polypodium-like). Synonymous with *D. strigosa.*

D. (Odontoloma) pulchella—Od-on-tol-o′-ma; pul-chel′-la (neat), *Hooker*.

A very pretty, stove species, of medium growth, native of the Philippine, Fiji, and Samoan Islands. Its elegant fronds, 4in. to 12in. long and ¾in. to 1in. broad, are produced from a slender, wide-creeping, and much-branched rhizome (prostrate stem), and are borne on slender, wiry, upright, naked stalks 2in. to 3in. long. The leaflets, of a soft, papery texture and naked on both surfaces, are slightly stalked and about ¼in. across; their lower margin is more or less curved upwards, while the upper one is cut into two to four blunt lobes, on which the small and inconspicuous sori (spore masses) are placed at a short distance from the edge.—*Hooker*, *Species Filicum*, i., p. 177, t. 548.

D. pulchra—pul′-chra (fair). Synonymous with *D. chærophylla*.

D. (Eudavallia) pyxidata — Eu-dav-al′-lĭ-a; pyx-id-a′-ta (box-like), *Cavanilles*.

This singular and interesting, greenhouse species, whose habit is totally distinct from that of all other Davallias furnished with rhizomes, is a native of New South Wales. Its stout, creeping rhizomes, which are densely clothed with long, narrow scales of a pale brown colour, possess the peculiarity of growing upwards to the height of 3ft. to 4ft., their points always standing up, thus giving the plant a sort of shrubby appearance. The fronds, which are produced on these strange-looking rhizomes, and borne on strong, upright stalks 4in. to 6in. long, are 9in. to 18in. long, 6in. to 9in. broad, deltoid (in shape of the Greek delta, Δ), and four times pinnatifid (cut nearly to the midrib). The pinnules of the lower leaflets are spear-shaped, 2in. to 3in. long, 1in. broad, and divided into oblong, toothed segments, the lowest of which are cut down nearly to the rachis (stalk). The sori (spore masses), which are disposed in the teeth of the segments, are deeply half-cup-shaped, and show a horn-like process projecting beyond them. The whole of the plant has a very pleasing appearance, as it is of a lively green colour, although deprived of the rich gloss which is generally found, and so much admired, on nearly all the other strong-growing species of *Davallia* that have fronds of a coriaceous (leathery) texture.—*Hooker*, *Species Filicum*, i., p. 170, t. 55c. *Nicholson*, *Dictionary of Gardening*, i., p. 447. *Lowe*, *Ferns British and Exotic*, viii., t. 21.

Although of a somewhat rigid habit when left to grow of its own accord, this species may, on account of the flexibility of its rhizomes, be used as a basket Fern.

Fig. 35. Davallia repens
(⅔ nat. size).

D. (Odontoloma) repens—Od-on-tol-o′-ma ; re′-pens (creeping), *Desvaux.*

A stove species, very variable in size, native of Ceylon, Java, Sumatra, the Mauritius and Polynesian Islands, and better known in gardens under the

name of *D. hemiptera*. Its fronds, which are produced from a comparatively slender, wide-creeping or climbing rhizome of a very scaly nature, are almost sessile (stalkless), or borne on very short stalks, being furnished with pinnæ (leaflets) nearly to their base. They are simply pinnate (only once divided to the midrib), 8in. to 18in. long, and 1in. to 1½in. broad. The leaflets, about ½in. long and half as broad as deep, have their lower line slightly curved, oblique at the base, while the upper one is rounded, nearly entire or notched and lobed (Fig. 35). They are of a soft, papery texture, and light green in colour. The large, marginal sori (spore masses) are often confluent when the fertile leaflets are not notched. The general appearance of the plant is somewhat similar to that of certain Lindsayas, but it is much easier of cultivation and of more vigorous growth.—*Hooker*, *Species Filicum*, i., p. 176. *Nicholson*, *Dictionary of Gardening*, i., p. 447.

D. (Odontoloma) retusa—Od-on-tol-o′-ma ; ret-u′-sa (retuse), *Moore.*

This very elegant, stove species, of large dimensions, native of Sumatra, is a bold-growing Fern of the most distinct character. Its fronds, in the form of an elongated triangle, 2ft. to 3ft. long and 1½ft. broad at the base, are produced on very close-growing underground rhizomes, and borne on smooth, erect, crimson stalks about 1ft. long. They are tripinnate, their leaflets being furnished with pinnules (leafits) of a peculiar form, which may be described as rhomboidal.—*Nicholson*, *Dictionary of Gardening*, iv., p. 531.

The light aspect of this species, together with its free growth, renders it an excellent Fern for growing in hanging baskets, in which position the pleasing contrast formed by the light, almost glaucous, colour of the leafy portion of the fronds and the crimson colour of their stalks is shown to perfection. The small and abundant sori (spore masses) are disposed on the dilated extremities of the very margin of the pinnules.

D. scaberula—scab-er′-ul-a (slightly rough). Synonymous with *D. hirta.*

D. scabra—scab′-ra (rough). A synonym of *D. marginalis.*

D. (Stenoloma) Schlechtendahlii—Sten-ol-o′-ma ; Schlech-ten-dahl′-ĭ-i (Schlechtendahl's), *Presl.*

This singular, stove species, native of Mexico and Guatemala, where it ascends to 5000ft. elevation, belongs to the small class of Davallias of

sarmentose or climbing habit. Its fronds, 2ft. to 3ft. long and 1ft. to 2ft. broad at the base, have their lower leaflets 9in. to 12in. long, 4in. to 6in. broad, and spreading or deflexed (thrown back), and pinnules (leafits) cut down to a narrowly-winged rachis (stalk). They are of a soft, papery texture, and their small, terminal sori (spore masses) are nearly globular.—*Hooker*, *Species Filicum*, i., p. 189, t. 54c.

D. (Humata) sessilifolia—Hum-a′-ta ; ses-sil-if-ol′-ĭ-a (stalkless-leaved), *Blume.*

A stove species, native of Java, the Celebes, and the Fiji Islands, with very long, wide-creeping rhizomes (prostrate stems) densely clothed with rigid, narrow scales. Its almost stalkless fronds, 2in. to 4in. long, 1½in. broad, are cut down nearly to the rachis (stalk of the leafy portion) into parallel, narrow, entire or sinuated (wavy-edged) lobes, the lower side of the lower ones being sometimes pinnatifid (cut nearly to the midrib). The sori (spore masses) are disposed in two rows in the lobes, and occupy the greater part of the space between the midvein and the margin.—*Hooker*, *Species Filicum*, i., p. 154.

D. (Eudavallia) solida—Eu-dav-al′-lĭ-a ; sol′-id-a (solid), *Swartz.*

This is a stove species, of medium growth, native of Java and the Polynesian Islands, and also known as *D. Lindleyi.* Its triangular fronds, of a leathery texture, 1ft. to 2ft. long, 1ft. to 1¼ft. broad, are produced from a stout rhizome (prostrate stem) densely clothed with closely-pressed scales or fibres, and borne on strong, upright stalks 4in. to 6in. long. They are three times pinnatifid (cleft nearly to the midrib), and their deeply-toothed segments are narrower and sharper in the fertile frond. The sori (spore masses) are quite marginal, being situated in the teeth of the segments.—*Hooker*, *Species Filicum*, i., p. 64, t. 42. *Nicholson*, *Dictionary of Gardening*, i., p. 447. *Lowe*, *Ferns British and Exotic*, viii., t. 27. *Beddome*, *Ferns of British India*, t. 104.

D. s. ornata—or-na′-ta (ornamented), *Wallich.*

This is the garden name of a large, handsome form of the above species, from which it differs only by its broader and slightly-cut segments.

D. (Microlepia) speluncæ — Mi-crol-ep′-ĭ-a ; spe-lun′-cæ (growing in caverns). Synonymous with *D. trichosticha.*

D. (Microlepia) strigosa—Mi-crol-ep′-ĭ-a ; strig-o′-sa (covered with strigæ, or hair-like scales), *Swartz*.

This very handsome, greenhouse species is also commonly called *D. khasyana* and *D. polypodioides*, the former on account of its origin, as it is a

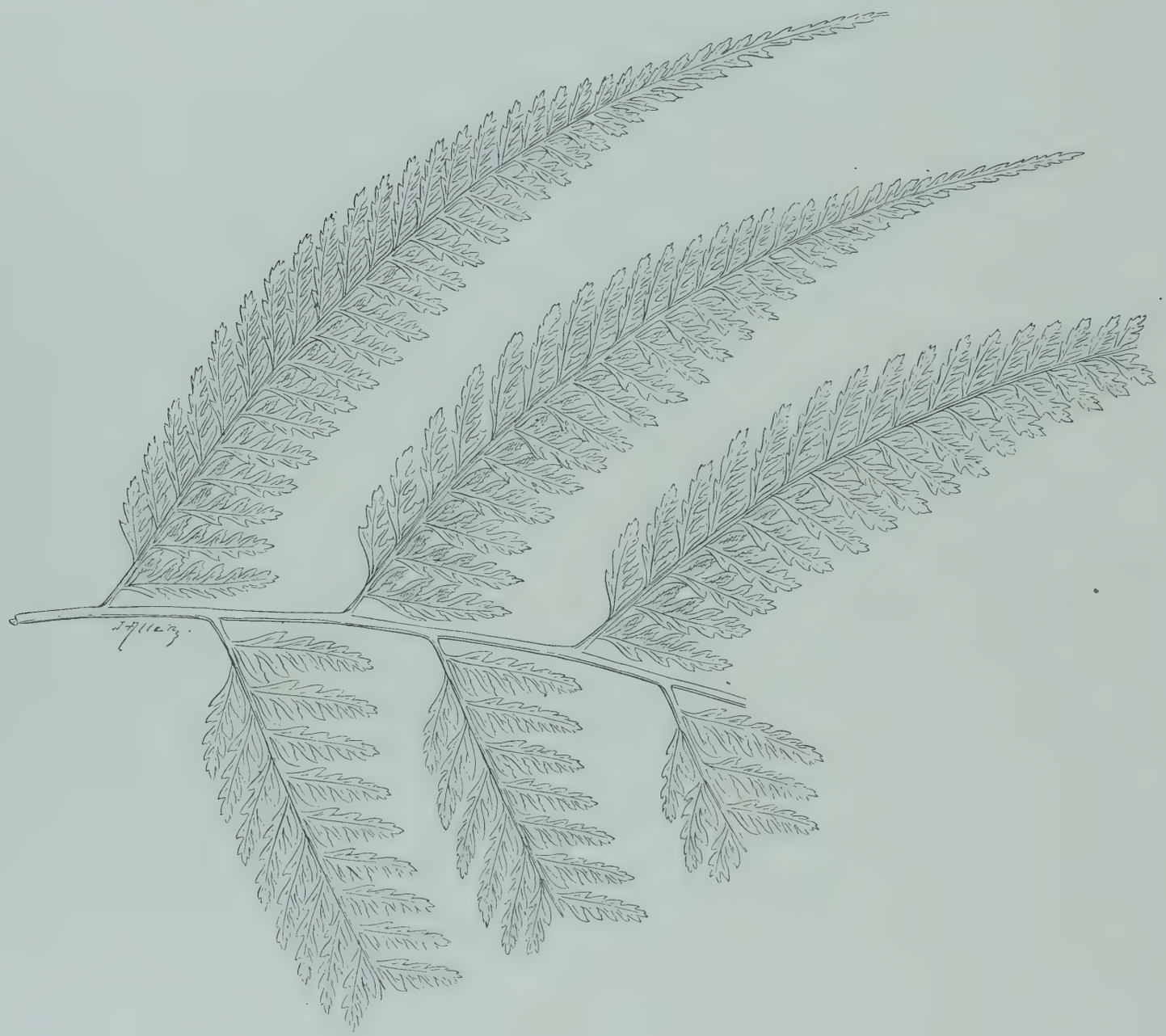


Fig. 36. Portion of Frond of Davallia strigosa (nat. size).

native of the Khasya Hills, in Northern India, and is said to grow on the Himalayas up to 5000ft. elevation. It is also found in Ceylon, Japan, the Malayan Islands, the Sandwich and Fiji Islands, &c. Its fronds (Fig. 36), 1ft. to 3ft. long and 6in. to 12in. broad, are produced from a stout, creeping

rhizome (prostrate stem) of a peculiarly downy nature, and borne on upright, strong stalks that are hairy throughout their whole length. They are spear-shaped and bipinnatifid (twice divided nearly to the midrib); their lower leaflets, 4in. to 8in. long and 1in. broad, are cut down to the rachis (stalk) into unequal-sided and rather bluntly-toothed, oblong pinnules (leafits) of a soft texture. The small and abundant sori (spore masses) are disposed two to twelve to a pinnule, and placed at the base of their lobes.—*Hooker*, *Species Filicum*, i., p. 173, t. 47A. *Nicholson*, *Dictionary of Gardening*, i., p. 447. *Lowe*, *Ferns British and Exotic*, viii., t. 32.

D. strigosa has a most graceful, arching habit, and is particularly adapted for growing in the rockery, where, strange as it may appear, it requires but little soil, comparatively to its robust habit, to develop its beautiful fronds, the softly hairy nature of which, coupled with the elegant form of their leaflets, gives it a most pleasing appearance.

D. s. rhomboidea—rhom-bŏ-i′-dĕ-a (rhomboidal), *Wallich.*

This is similar in texture and hairiness to *D. strigosa*, but is much larger in all its parts; its lower leafits, about 1½in. long, are cut down nearly to the rachis (stalk) into oblong lobes.—*Nicholson*, *Dictionary of Gardening*, i., p. 447.

D. (Stenoloma) tenuifolia—Sten-ol-o′-ma; ten-ŭ-if-ol′-ĭ-a (slender-leaved), *Swartz.*

A greenhouse species, native of Tropical Asia and Polynesia, where it is common; it is also abundant in Japan, and in the Himalayas, where it is met with at an elevation of 5000ft. Its elegant, egg-shaped fronds, 1ft. to 1½ft. long and 6in. to 9in. broad, are produced from a very short-creeping rhizome (prostrate stem), and borne on strong, upright, polished, naked stalks 6in. to 12in. long. The lower leaflets, 4in. to 6in. long and 2in. to 3in. broad, are spear-shaped, and so are their pinnules (leafits), which are again cut down into segments with toothed, cuneate (wedge-shaped) lobes. The sori (spore masses) are usually disposed singly, but sometimes in pairs, at the extremity of the segments, and are often broader than deep.—*Hooker*, *Species Filicum*, i., p. 186. *Nicholson*, *Dictionary of Gardening*, i., p. 447. *Lowe*, *Ferns British and Exotic*, viii., t. 14.

D. tenuifolia is a highly decorative Fern, and the pale green colour of its fronds greatly adds to their beauty. It is of very easy cultivation, but there must be no loam in the soil.

There are in commerce two varieties, as totally distinct from the typical species as they are from each other:

D. t. stricta—stric′-ta (upright), *Moore.*

In this variety the fronds are not only of more upright habit than those of the typical form, but they are also larger in all their parts, and the leaflets as well as their segments are of a darker hue and more leathery texture.

D. t. Veitchiana—Veitch-ĭ-a′-na (Veitch's), *Moore.*

The rhizomes (prostrate stems) of this variety are of such a very short-creeping nature that the plant appears quite destitute of the hare's-foot-like growths so peculiar to Davallias in general, its fronds being produced in great abundance from what appears to be a densely-tufted crown formed by underground rhizomes. It is a most beautiful and distinct variety, easily distinguished from the type by its elegant and pendulous, plume-like fronds, 2½ft. to 3ft. in length, including the stalks, very finely cut and gracefully arching on all sides (see Plate, for which we are indebted to Messrs. James Veitch and Sons). Their leafy portion, of a broadly spear-shaped outline, is furnished with numerous leaflets, which are divided into lace-like pinnules (leafits) and segments, much longer and slenderer than those of any other kind, and the pale green colour of which forms a striking and most pleasing contrast with the warm red tinge of their slender, round, flexible stalks. This variety is a native of the Straits Settlements, where it is found in open places only (never occurring in dense jungles), and whence it was introduced by the late Dr. J. T. Veitch, whose name it perpetuates. It is now abundant in the neighbourhood of the Government Experimental Nurseries, Penang, where it is seen at its best growing at about 2000ft. elevation, and where it was introduced from other parts of the Island by Mr. Charles Curtis.—*Nicholson, Dictionary of Gardening*, iv., p. 531.

Its light, drooping habit makes *D. t. Veitchiana* one of the best of stove basket Ferns in cultivation; like those of the typical species, its roots are averse to loam, and are also very sensitive to the effects of drought.

D. (Eudavallia) trichomanoides—Eu-dav-al′-lĭ-a ; trich-om′-an-ŏ-ĭ′-dēs (Trichomanes-like), *Blume.*

This very pretty, stove species, the name of which is also wrongly applied to *D. ferulacea*, is provided with wide-creeping rhizomes ¼in. thick, covered with long, narrow, pale brown scales. It is a native of the Malay Islands, and also of Ceylon, where it was found by Thwaites, on Adam's Peak, at about 3000ft. elevation. Its fronds, 6in. to 9in. long, of an elongated-triangular shape and four times pinnatifid (divided half-way to the midrib), are borne on grey, naked stalks 3in. to 6in. long. The leaflets are distinctly stalked, spear-shaped, the lowest and largest being 1½in. to 2in. broad, and divided into close, spear-shaped pinnules (leafits), which in their turn are cut into strap-shaped segments of a somewhat leathery texture. The sori (spore masses), which are rather deeper than broad, mostly show a horn projecting beyond on both sides. Fig. 37 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker, Species Filicum*, i., p. 186. *Beddome, Ferns of British India*, t. 178.

Fig. 37. Davallia trichomanoides
(⅓ nat. size)

D. (Microlepia) trichosticha—Mi-crol-ep′-ĭ-a ; trich-os′-tich-a (having hairs disposed in rows), *Hooker.*

A strong-growing, stove species, also found in gardens under the name of *D. speluncæ ;* it has a wide geographical range, being a native of Hindostan,

ascending in the Himalayas to 7000ft. elevation, also of China, Ceylon, the Polynesian Islands, Queensland, Madagascar, West Tropical Africa, &c. It is a very distinct and uncommon Fern, easily grown, and well worthy of extensive cultivation. The pale green fronds, of a soft, papery texture, 3ft. to 6ft. long, 1ft. to 2ft. broad, somewhat triangular, and three or four times pinnatifid (cut nearly to the midrib), are borne on strong stalks 1ft. to 1½ft. long. The lower leaflets, 6in. to 12in. long and 3in. to 4in. broad, are divided into spear-shaped leafits, which are cut down to the rachis (stalk of the leafy portion) below into oblong, deeply-toothed lobes. The small and abundant sori (spore masses) are placed one or more together at the base of the lobes.—*Hooker*, *Species Filicum*, i., p. 183. *Lowe*, *Ferns British and Exotic*, viii., t. 29.

D. (Odontoloma) triquetra—Od-on-tol-o′-ma ; tri-quet′-ra (triangular), *Baker*.

A very distinct, stove species, native of Java, New Caledonia, Fiji, and the Samoan Islands. Its fronds, of a somewhat transparent, papery texture, and borne on strong, upright stalks 4in. to 6in. long, are composed of six or seven pairs of leaflets and a terminal one ; the lateral ones, 3in. to 4in. long and ½in. broad, have their pinnules (leafits) cut down on the upper side into simple or forked, very narrow segments, on the summit of which the sori (spore masses) are disposed.—*Hooker*, *Synopsis Filicum*, p. 93.

D. (Humata) Tyermanni — Hum-a′-ta ; Ty-er-man′-ni (Tyermann's), *Baker*.

This very handsome, greenhouse species, native of the West Coast of Africa, is popularly known as the "Bear's-foot Fern," on account of the narrow, silvery-white scales with which its wide-creeping rhizomes (prostrate stems) are densely clothed. Its fronds, of a bright green colour and somewhat leathery texture, are somewhat scantily produced ; they are triangular in shape, 4in. to 6in. long, four times pinnatifid (cut nearly to the midrib), and borne on naked stalks 2in. to 3in. long and of a reddish colour. The sori (spore masses), disposed at the base of the ultimate lobes, are covered by hemispherical involucres that are free at the sides.—*Hooker*, *Synopsis Filicum*, p. 467. *Nicholson*, *Dictionary of Gardening*, i., p. 447.

D. (Microlepia) urophylla—Mi-crol-ep′-ĭ-a ; u-roph-yl′-la (tailed-leaved), *Hooker.*

A strong-growing, stove species, also known as *Microlepia caudigera*, native of Bhotan, the Khasya Hills, and Kumaon. Its massive fronds, 2ft. to 3ft. long and three times pinnatifid (cut nearly to the midrib), are borne on strong, erect stalks of the same length ; their lower leaflets, 9in. to 12in. long and 6in. to 8in. broad, are spear-shaped and furnished with pinnules (leafits) of a leathery texture, which are cut down to the rachis (stalk) below into unequal-sided, broadly-toothed lobes. The nearly marginal sori (spore masses) are disposed one to each of the lower notches of the lobes.—*Hooker, Species Filicum*, i., p. 172. *Beddome, Ferns of British India*, t. 253.

D. (Humata) vestita—Hum-a′-ta ; ves-ti′-ta (clothed), *Blume.*

A stove species, native of Ceylon and Java, and very closely related to *D. pedata*, being of similar dimensions, and its fronds, triangular in shape and also of a leathery texture, differing from those of that species only through the barren ones having all their segments, except those of the lower leaflets, blunt and scarcely toothed. The lobes of the fertile segments, in the teeth of which the sori are placed, are narrower and more sharply toothed.—*Hooker, Species Filicum*, i., p. 156, t. 41c. *Beddome, Ferns of Southern India*, t. 253.

D. villosa—vil-lo′-sa (hairy). Synonymous with *D. marginalis.*

D. (Microlepia) Wilfordii—Mi-crol-ep′-ĭ-a ; Wil-ford′-ĭ-i (Wilford's), *Baker.*

This pretty, distinct, greenhouse species, native of Japan, somewhat resembles the better-known *D. ciliata*, *D. marginalis*, and *D. strigosa* in appearance, and in the soft and hairy nature of its fronds, which are, however, of much smaller dimensions, being seldom more than 9in. long and 3in. broad. They are equally spear-shaped, but tripinnatifid (three times cleft nearly to the midrib) ; their lower leaflets being cut down to the rachis (stalk) below into broadly-egg-shaped and sharply-toothed leafits, each of which bears two to six sori at the summit of their teeth.—*Hooker, Second Century of Ferns*, t. 48.

DENNSTÆDTIA—Denn-stæd′-tĭ-a. *See* **Dicksonia.**

CHAPTER XII.

DEPARIA, *Hooker and Greville.*

(Dep-ar′-ĭ-a.)

INCLUDING *Cionidium* of T. Moore and *Trichocarpa* of J. Smith, this small genus, composed entirely of stove Ferns, derives its name from *depas*, a cup, in allusion to the form of the involucre (covering of the sori), which is shallowly-cup-shaped, membranous (thin and more or less transparent), and not two-valved. In Hooker and Baker's "Synopsis Filicum" *Deparia* forms Genus 14. It comprises four very rare tropical species, with broad, ample, leafy segments, which differ from *Dennstædtia* of Bernhardi and Moore mainly by their extra-marginal sori (spore masses), which protrude from the margin of the frond, or are sometimes even stipitate (furnished with a stalk-like support).

Culture.

The soil most suitable to Deparias, which are not very strong growers, is a compost of an open nature, formed of about equal parts of fibrous peat, leaf mould, and silver sand. Special attention should be given to the drainage: deficiency in this respect is the principal cause of failure in the cultivation of these plants, which at all times require a liberal supply of water at the roots, but dislike syringing overhead. The Deparias should also be carefully protected against the direct rays of the sun. They are usually propagated by division of the crowns in March and April, their spores being seldom known to germinate.

Species.

D. concinna—con-cin′-na (neat), *Baker.*

This species, generally found in gardens under the name of *D. Matthewsii*, is a very elegant Fern, with fronds bipinnate (twice cut to the midrib) and of a somewhat leathery texture. The lower leaflets, fully 1ft. long and 2in. broad, are cut down to the rachis (stalk) in their lower part, but become nearly entire towards their extremity; their lobes are entire, blunt, unequal-sided, and decurrent (partially united to the midrib downwards). The slightly-stalked sori (spore masses) are disposed two to six to a lobe, round the edge of which they are placed.—*Hooker, Species Filicum*, i., p. 75, t. 30B. *Nicholson, Dictionary of Gardening*, i., p. 459.

D. Macræi—Mac-ræ′-i (Macray's). Synonymous with *D. prolifera.*

D. Matthewsii—Mat-thews′-ĭ-i (Matthews'). A synonym for *D. concinna.*

D. Moorei—Moor′-ĕ-i (Moore's), *Hooker.*

An interesting species, and probably the prettiest of the genus; it has been named *Cionidium Moorei* by T. Moore, and *Trichocarpa Moorei* by J. Smith, and is a native of New Caledonia, where it has been gathered by Charles Moore and by Lenormand. *D. Moorei* is a very conspicuous-looking Fern, inasmuch as the sori (spore masses) are situated at the apex of the veins and extend beyond the margins of the fertile fronds. All the fronds are 1ft. to 1½ft. long, 6in. to 9in. broad, heart-shaped and triangular, and of a thin, papery texture; their lower portion is pinnate (divided to the midrib), but their upper portion is only pinnatifid (divided nearly to the midrib). The lower leaflets of the fertile fronds, 6in. to 9in. long and 4in. to 6in. broad, are cut down to the rachis (stalk) below into broadly-toothed lobes (Fig. 38), on the margins of which the numerous and distinctly-stalked sori are situated.—*Hooker, Exotic Ferns*, t. 28. *Nicholson, Dictionary of Gardening*, i. p. 459.

D. nephrodioides—Neph-ro-dĭ-ŏ-i′-dēs (Nephrodium-like), *Baker.*

This is the strongest-growing species of the genus, and is a native of Lord Howe's Island. Its fronds, 1½ft. to 2ft. long, are nearly triangular and quadripinnate (four times divided to the midrib). The lowest leaflets, which are

the largest, are deltoid (in shape of the Greek delta, Δ), long-stalked, and divided into short-stalked pinnules (leafits) of the same shape, but cuneate (wedge-shaped) at their base; their segments, somewhat spear-shaped, are cut

Fig. 38. Barren Frond of Deparia Moorei
(⅔ nat. size).

down to a narrow wing into oblique-oblong, blunt lobes ¼in. long and of moderately firm texture. The very small sori (spore masses) are disposed one

on the anterior edge of each final lobe; they are globose, prominent, but sessile (stalkless).—*Hooker*, *Synopsis Filicum*, p. 463. *Nicholson*, *Dictionary of Gardening*, i., p. 459.

D. prolifera—pro-lif′-er-a (proliferous or bud-bearing), *Hooker*.

A native of the Sandwich Islands, also known as *D. Macræi*. It has fronds only once pinnate; the lower leaflets, 6in. to 9in. long and 1in. to 1½in. broad, are pinnatifid throughout, the divisions extending within a short distance of the rachis (stalk); their lobes, oblong, slightly toothed, of a thin, papery texture, and light green in colour, are disposed with a space often equalling their own breadth between them. The fronds occasionally bear young plants at their point, hence the specific name. The sori (spore masses), four to twelve to a lobe, are sometimes sessile (stalkless) and sometimes short-stalked, but always situated on the very margin of the lobes.—*Hooker*, *Species Filicum*, i., p. 85. *Nicholson*, *Dictionary of Gardening*, i., p. 459. *Lowe*, *Ferns British and Exotic*, viii., t. 38.

CHAPTER XIII.

DIACALPE, *Blume.*

(Dĭ-ac-al′-pe.)

DIACALPE, which seems more appropriately placed with the *Cyatheæ* than with the *Dicksonieæ*, and which in Hooker and Baker's "Synopsis Filicum" forms Genus 7, is monotypic —that is to say, it is composed of a solitary species. Its name is derived from *dia*, through, and *calpis*, an urn, in reference to the arrangement of the spore cases, which are disposed in numerous and almost stalkless capsules. The chief peculiarity in this genus is the hard, globose, entirely closed involucre (covering), which at last bursts open irregularly, and is affixed to the sorus (spore mass) by a small point of contact.

D. aspidioides—as-pid-ĭ-ŏ-ĭ′-dēs (Aspidium-like), *Blume.*

This stove species is a native of the Malayan Islands, Sylhet, Assam, and Ceylon. It is an easily grown plant, its requirements being similar to those of the strong-growing Aspleniums, and it is very striking on account of the rich dark green colour of its massive fronds (see Coloured Plate) of a graceful habit. These are 1½ft. to 2ft. long, including the smooth and comparatively slender stalks on which they are borne, and about 1ft. broad; they are broadly ovate (egg-shaped), and of a sub-membranous (thin and more or less transparent) texture. The leaflets, of the same shape as the leafy portion of the frond itself, have their pinnules (leafits) of a peculiar oblong-wedge-shape, lobed, and as the plant becomes older more or less decurrent (partly

united to the stalk by their midvein). This handsome Fern is readily propagated by its spores, which are abundantly produced and disposed one mass to a pinnule, on the midvein of which they are attached by a very short stalk.—*Hooker*, *Species Filicum*, i., p. 59. *Nicholson*, *Dictionary of Gardening*, i., p. 461. *Beddome*, *Ferns of Southern India*, t. 257.

CHAPTER XIV.

DICKSONIA, *L'Héritier.*

(Dick-so′-nĭ-a.)

THE genus *Dicksonia*, which forms by far the most important division of the tribe *Dicksonieæ*, was named in honour of James Dickson, a famous British cryptogamic botanist. It was first proposed by L'Héritier, in 1788, for two species—*D. culcita*, a native of the Azores and Madeira, and *D. arborescens* of St. Helena. In these two species the involucre (covering of the spore masses) is distinctly two-valved, the outer valve being formed from the apex of a lobe or segment. In 1801 Bernhardi proposed a genus *Dennstædtia;* but this was promptly rejected by Schkuhr and Willdenow, and the plants belonging to it were referred to *Dicksonia*, which, by 1810, was made to embrace as many as twenty species. The authors of the "Synopsis Filicum," in which work it is given as Genus 13, further enlarged *Dicksonia* by adding to it the species of *Cibotium*, but these have the outer half of the involucre separate from the lobule.

The genus *Dicksonia*, as it stands at present, includes the following sections :

Balantium (Bal-an′-tĭ-um), *Kaulfuss and J. Smith*, the characters of which are similar to those of *Eudicksonia.*

Cibotium (Cib-o′-tĭ-um), *Kaulfuss*, in which the involucre is distinctly two-valved, the outer valve being coriaceous (leathery) and distinct from the substance of the frond.

Dennstædtia (Denn-stæd′-tĭ-a), *Bernhardi and Moore*, which possesses the same distinctive characters as *Patania*.

Eudicksonia (Eu-dick-so′-nĭ-a), of various authors, having a distinctly two-valved involucre, the outer valve of which is formed by the apex of a segment.

Patania (Pat-an′-ĭ-a), *Presl*, with a cup-shaped involucre, not at all, or very indistinctly, two-valved.

Sitolobium (Si-tol-ob′-ĭ-um), *J. Smith*, a section of plants provided with rhizomes (prostrate stems), and with a cup-shaped, nearly spherical involucre placed at the base of the depression of the lobes.

The genus *Dicksonia*, as now accepted, contains about forty known species of stove and greenhouse Ferns, the majority of which are native of Tropical America and Polynesia. One species, *D. punctiloba*, however, reaches as far north as Canada, and several others are scattered throughout the northern parts of the Temperate zone; but there are no British representatives of the genus. About half the known species are of arborescent habit, and in the countries where these are indigenous they form quite a distinct feature in the vegetation with their immense yet finely-cut fronds, of a leathery texture, under the shadow of which travellers often make a halt, sleeping in blankets spread upon their gathered fronds. The others have creeping rhizomes, and, with two exceptions, *D. abrupta* and *D. Elwesii*, all the known species have their fronds at least twice divided to the midrib.

Culture.

The majority of the Dicksonias only require cool treatment; most of the arborescent kinds being found growing in valleys and in deep, shaded ravines, and in countries where some of them occasionally have their fronds heavily loaded with snow. *D. antarctica*, especially, grows in great abundance on Mount Wellington, in Tasmania, where it is often subjected to a much cooler temperature than that in which it is usually kept under cultivation, and where it has, in fact, to withstand somewhat severe frosts, although these are only of short duration. This species thrives when planted outside in sheltered spots in different parts of England, Wales, and Ireland. Wherever a suitable spot exists, Tree Ferns should be introduced, as they present

a peculiarly beautiful and noble, tropical appearance by their singular contrast with hardy exotic as well as with native ornamental trees, with which they may then be surrounded. All the known Dicksonias of arborescent habit are robust growers, and their usually straight trunks possess the advantage of being generally of good proportions and of symmetrical habit; they also are of a much more fibrous nature than those of most other Tree Ferns, thus storing up a much greater quantity of moisture, and retaining it for a longer period fit for the natural and essential requirements of growth, and at the same time necessitating less attention and less labour than Cyatheas and Alsophilas. Whilst in the last-named genera stems of all dimensions, even down to that of an ordinary walking-stick, may be seen, the trunks of all arborescent Dicksonias are of moderate thickness. The species composing this genus also produce much handsomer heads of foliage than most other Tree Ferns, and, as a rule, the quantity of fronds is proportionate to the bulk of the trunk. It is not at all rare to find stems of good dimensions producing every year from thirty to forty fronds, which they generally retain until the following set is perfectly developed and matured, provided they do not suffer from want of water at the roots or on the stems during the winter season; for, although then at rest, the fronds will soon shrivel up if the trunks are allowed to get dry.

When Dicksonias are grown in pots, it is indispensable that water should be applied freely to their roots all the year round, or they will show the effects of a day's neglect in an unmistakable way, and a very long time will elapse before they recover the damage done during that short time. The plants are all the more likely to suffer from want of water when grown in pots, as these should be of the smallest size possible consistent with the dimensions of the trunks. As a rule, when not planted out, all Tree Ferns thrive best in pots or tubs in which only three or four inches of soil all round the trunks is allowed. The most suitable compost is a mixture of two parts fibrous peat, one part fibrous loam, and one part coarse silver sand. However good their growth may be when cultivated in pots, it cannot equal their vigour when grown in the open ground, in which case the bottom must be particularly well drained; for although these plants require a constant supply of water, their roots soon decay when stagnancy is allowed. To produce luxuriant and lasting foliage, Dicksonias should during the summer

have their trunks thoroughly watered twice a day; but these copious waterings should gradually decrease as the season advances, and during the winter the trunks should only be kept constantly moist, the heads being slightly shaded during the hottest summer days only.

Dicksonias of arborescent habit are invariably propagated from their spores, which they produce in great abundance, and which germinate very freely. Those species which are provided with rhizomes may be increased by the division of those organs, an operation which is best done in March or April; but when required in large quantities, it is found more advantageous to propagate them from spores in the usual way.

Principal Species and Varieties.

D. (Eudicksonia) abrupta—Eu-dick-so′-nĭ-a; ab-rup′-ta (abrupt), *Bory.*

This stove plant, native of the Bourbon Islands, is thoroughly distinct from all other known species through the simply-pinnate (once-divided) character of its fronds, 1ft. to 1½ft. long, 4in. to 6in. broad, furnished on both sides of their midrib with sessile (stalkless), spear-shaped leaflets that are scarcely toothed and of a leathery texture. The lower of these leaflets, about 3in. long and 1in. broad, have their two halves rather unequal, the base of the upper one being truncate (terminating abruptly) and that of the lower one slightly eared. The fertile leaflets are narrow and acuminate (terminating in a long, slender point), with numerous sori (spore masses) placed along both edges. *D. abrupta* is a most peculiar plant, its habit and general appearance being very like that of the well-known *Nephrolepis davallioides.*—*Hooker, Species Filicum*, i., p. 72.

D. (Patania) adiantoides—Pat-an′-ĭ-a; ad-ĭ-ant-ŏ-i′-dēs (Adiantum-like), *Humboldt, Bonpland, and Kunth.*

A very strong-growing, stove species, native of Tropical America, its habitat extending from the West Indies southward to Brazil. Its gigantic fronds, which are produced from a creeping rhizome (prostrate stem) and sometimes attain 12ft. in length, are bipinnate (twice divided to the midrib). Their lower leaflets, 1ft. to 2ft. long and 6in. to 12in. broad, have their pinnules (leafits) cut down in the lower part nearly to the midrib; these

pinnules, of a soft, papery texture and slightly hairy underneath, have oblong, blunt segments with from two to four bluntish lobes on each side, which do not reach half-way to the rachis (stalk of the leafy portion). The sori (spore masses), covered by a cup-shaped involucre, are disposed two to eight to a segment, and placed at the base of the sinuses (notches) between the lobes. —*Hooker*, *Species Filicum*, i., p. 75, t. 26B. *Nicholson*, *Dictionary of Gardening*, i., p. 467.

D. (Eudicksonia) antarctica—Eu-dick-so′-nĭ-a ; ant-arc′-tic-a (Antarctic), *Labillardière.*

This magnificent, greenhouse species, native of Eastern Australia and Tasmania, is a universal favourite. Though it is the commonest of all the arborescent Ferns in cultivation, it always attracts special attention, and is much admired on account of its trunk, which, although varying considerably in thickness, is generally proportionate to its height. Although it is said to attain the height of 35ft., the handsomest specimens that one usually meets with measure from 18ft. to 20ft. high. Its massive fronds, 3ft. to 6ft. long, 2ft. to 3ft. broad in the centre, and borne on stalks barely 1ft. long, which in their young state are densely covered with narrow, fibrous scales of a dark purple-brown colour, are tripinnate (three times divided to the midrib), spear-shaped, and, when fully developed, furnished with thirty to forty pairs of fully-pinnate leaflets (Fig. 39). The central leaflets are 1ft. to 1½ft. long and 4in. to 5in. broad ; their pinnules (leafits), about ½in. broad and of a leathery texture, are sessile (stalkless), of a rich shining-green colour above, paler beneath, and subdivided into oblong, deeply-cleft segments, the sori (spore masses) being disposed six to ten on the lowest only. These sori, globose in form and produced on the extremities of the smaller veins, are small but numerous, and their indusium (covering) is of a leathery texture. A fine specimen of this species is shown in the foreground of our View in the Fernery of the Royal Botanic Gardens, Manchester.—*Hooker*, *Species Filicum*, i., p. 66. *Nicholson*, *Dictionary of Gardening*, i., p. 467. *Lowe*, *Ferns British and Exotic*, viii., t. 43.

D. antarctica is a large and rapid grower, easily cultivated, and requiring very little attention to produce its handsome fronds, which in some specimens are of an upright and somewhat rigid habit, whereas in others they are

pendulous, and forty to fifty are often seen on one plant at the same time. Its only requirements consist in sufficient space for the expansion of its fronds, and a liberal supply of water on the trunk and at the roots. This caution is applicable to all fast-growing Ferns, most of the large species existing naturally in moist and boggy situations. In Tasmania, where it is found in abundance, this noble species is so great a feature that the landscape where it grows enjoys the appellation of the "Fern Valley." On account of the hardiness of its constitution, and of the marvellous symmetry of its trunk and crown of fronds, *D. antarctica* is admirably adapted for the decoration of the conservatory, whether planted out or grown in a pot or tub.

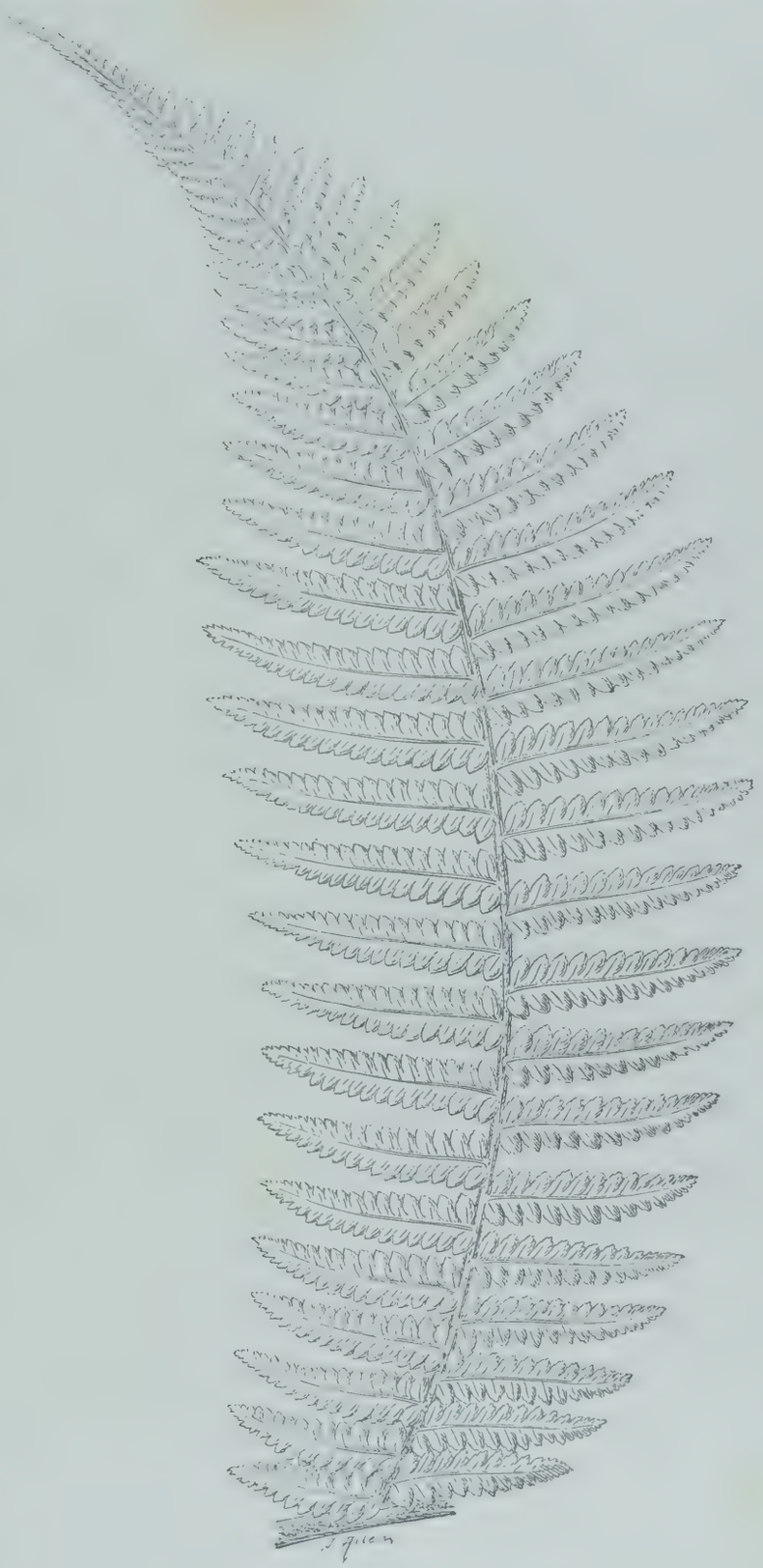


Fig. 39. Pinna of Dickson'a antarctica (½ nat. size).

D. anthriscifolia — an-thris′-cif-ol′-ĭ-a (Anthriscus-leaved). A variety of *D. rubiginosa.*

D. (Patania) apiifolia—Pat-an′-ĭ-a; ap′-ĭ-if-ol′-ĭ-a (Parsley-leaved), *Hooker.*

A strong-growing, stove species, native of the Andes of Ecuador and Peru, with somewhat rigid fronds of a bright green colour and fully tripinnate (three times divided to the midrib). The lower pinnæ (leaflets), 1ft. to 1½ft. long and 6in. to 9in. broad, are cut into long, narrow pinnules (leafits), and their

lowest segments, with sharply-toothed lobes, are about 1in. long and ½in. broad. The sori (spore masses), two to twelve to a segment, are placed at the bottom of the notches of the lobes, and are covered by a cup-shaped, nearly round involucre.—*Hooker*, *Species Filicum*, i., p. 77, t. 26G.

D. (Patania) appendiculata—Pat-an′-ĭ-a ; ap-pen-dic-ul-a′-ta (having appendages), *Wallich.*

A stove species, in general habit resembling *Asplenium Filix-fœmina*, and a native of Nepaul and Kumaon. Its fronds, 1ft. to 1½ft. long, spear-shaped, and bipinnate (twice divided to the midrib), are produced from a creeping rhizome (prostrate stem). Their lower leaflets, 3in. to 4in. long and narrow-spear-shaped, are cut down quite to the rachis (stalk) except at their extremity ; they are of a soft, papery texture, and their pinnules (leafits), ½in. long, are again cut to within a short distance of the rachis into numerous narrow lobes. The sori (spore masses), two to sixteen to a pinnule, are placed at the base of the notches, and are covered by a round, cup-shaped involucre.—*Hooker*, *Species Filicum*, i., p. 79, t. 27G. *Beddome*, *Ferns of British India*, t. 82.

D. (Eudicksonia) arborescens—Eu-dick-so′-nĭ-a ; ar-bor-es′-cens (tree-like), *L'Héritier.*

This handsome, greenhouse, arborescent species, native of the island of St. Helena, where it is found near the summit of Diana's Peak, and still rare in cultivation, is of very peculiar appearance on account of its trunk, which seldom exceeds 10ft. in height, being generally found with several branches, each terminated by a crown densely clothed with amber-coloured, silky hairs. Its fronds, which are bipinnate (twice divided to the midrib) and of a very leathery texture, have their lower leaflets 1ft. to 1½ft. long, with blunt pinnules (leafits) and oblong segments. Their stalks are woolly throughout, and their fertile pinnules often conspicuously contracted. The sori (spore masses), two to six to a segment, are large, globose, and covered by a distinctly two-valved involucre.—*Hooker*, *Species Filicum*, i., p. 66, t. 22A. *Nicholson*, *Dictionary of Gardening*, i., p. 467.

D. assamica—as-sam′-ic-a (from Assam). A common garden name for *D. Barometz.*

D. (Cibotium) Barometz—Cib-o′-tĭ-um ; Bar′-om-etz (Barometz), *Link.*

A handsome, greenhouse species, which, on account of the singular appearance of its decumbent, massive, hairy rhizome (prostrate stem), is known under the popular name of "Vegetable Lamb"; it is a native of Assam (being known in gardens as *D. assamicum*), China, and the Malayan Peninsula and Islands. The handsome fronds, of a leathery texture and 6ft. to 8ft. long, are tripinnate (three times divided to the midrib) and triangular in shape. The lower leaflets, 1ft. to 2ft. long and 6in. to 12in. broad, have their pinnules (leafits) narrow, sharp-pointed, and cut down within a short distance from the rachis (stalk) in their upper portion and sometimes quite down to it at their base. Their upper surface is a dark, shining green, whereas their underside is of a beautiful glaucous colour. The stalks and rachis are more or less densely clothed throughout with long, light-brown hairs, and the sori (spore masses), disposed two to twelve to a pinnule, are covered by a distinctly two-valved involucre.—*Hooker*, *Species Filicum*, i., p. 82. *Nicholson*, *Dictionary of Gardening*, i., p. 467. *Lowe*, *Ferns British and Exotic*, viii., t. 36. *Beddome*, *Ferns of British India*, t. 83.

D. (Eudicksonia) Berteroana — Eu-dick-so′-nĭ-a ; Ber-ter-o-a′-na (Bertero's), *Hooker.*

This very handsome, greenhouse species, native of Juan Fernandez, possesses a special interest, inasmuch as it is one of the very few plants in cultivation which are indigenous to that remarkable island only. It is a very robust-growing subject, its fronds and their stalks being thicker and stouter than those of most other known Dicksonias. The trunk, which attains about 15ft. in height, is also of a drier nature than that of most other species of this genus, and from the dark brown hairy crown at its summit a tuft of arching fronds spreads gracefully in all directions (see Plate). These fronds are bipinnate (twice divided to the midrib), about 7ft. long, 2ft. to 2½ft. broad, and of a leathery texture. The long-spear-shaped leaflets, 1ft. to 1¼ft. long, are furnished with sessile pinnules (stalkless leafits), spear-shaped, undulated at the margins, blunt at their extremity, and overlapping each other, or at least so closely set as to produce quite a massive appearance. The fertile segments are deeply pinnatifid (cleft nearly to the midrib), while the barren ones are nearly entire (undivided). The sori (spore

masses), covered by rigid, round involucres, are disposed six to eight to the lowest segments, which they entirely fill, except the broad midrib and the extremity. In a young state, *D. Berteroana* is also of elegant and symmetrical habit, although not showing its truly beautiful characters until about 2ft. high. It is one of the most pleasing conservatory or greenhouse Ferns; on account of its firm and durable texture, its verdant appearance is preserved for an indefinite period, and it generally still retains all its old and mature fronds when the young growths make their appearance in the spring.—*Hooker*, *Species Filicum*, i., p. 67, t. 23A. *Nicholson*, *Dictionary of Gardening*, i., p. 467.

D. Blumei—Blu′-mĕ-i (Blume's). A synonym of *D. chrysotricha*.

D. (Eudicksonia) Brackenridgei—Eu-dick-so′-nĭ-a; Brack-en-ridg′-ĕ-i (Brackenridge's), *Mettenius*.

A stove species, native of the Fiji and Samoa Islands, very similar in general appearance to *D. Berteroana*, with trunk reaching about 15ft. in height, and thick, leathery, thrice-pinnate fronds, but distinct through its fertile and barren pinnules (leafits) being nearly always found mixed together on the same leaflets.—*Hooker*, *Synopsis Filicum*, p. 462.

D. (Cibotium) Chamissoi — Cib-o′-tĭ-um; Cham-is-so′-i (Chamisso's), *Hooker and Baker*.

This stove species, native of Oahu and the Sandwich Islands, appears to be closely related to the two species just described; its fronds, tripinnate (thrice divided to the midrib) and of a leathery texture, have their lower leaflets 1ft. to 1½ft. long, 6in. to 9in. broad, and divided into narrow, sharp-pointed pinnules (leafits), which are cut down to the rachis (stalk) below. The oblong, bluntish segments each bear from two to twelve spore masses, which are covered by an involucre of two unequal valves, the outer one larger and nearly orbicular, the inner one smaller and oblong.—*Hooker*, *Species Filicum*, i., p. 83. *Nicholson*, *Dictionary of Gardening*, i., p. 467.

D. (Eudicksonia) chrysotricha — Eu-dick-so′-nĭ-a; chry-sot′-rich-a (golden-haired), *Moore*.

A very handsome, greenhouse species, from Java, where it is found at an elevation of 11,000ft. Its trunk, of moderate thickness, is clothed all over

with dark brown and very brittle roots descending from the crown, which is also of the same colour and produces gracefully-arching, almost pendulous fronds 6ft. to 7ft. long and bipinnate (twice divided to the midrib). The lower leaflets, 1ft. to 1½ft. long and 6in. to 9in. broad, have their pinnules (leafits) cut down quite to the rachis (stalk), except towards their extremity, their segments being deeply toothed and bluntish. The main rachis and the stalk are clothed with a thick coat of shining, yellowish-brown hairs on their entire length. The fertile pinnules are slightly contracted, and their sori (spore masses) are disposed two to six to a segment. This species is also known as *D. Blumei*, *D. magnificum*, and *Cibotium speciosum.—Hooker*, *Synopsis Filicum*, p. 50. *Nicholson*, *Dictionary of Gardening*, i., p. 467.

D. (Patania) cicutaria—Pat-an′-ĭ-a ; cic-u-ta′-rĭ-a (Cicuta-like), *Swartz.*

This very handsome, strong-growing, stove Fern, native of Tropical America, from Mexico and the West Indies southward to Rio Janeiro and Peru. Its massive fronds, 4ft. to 8ft. long and borne on strong, hairy stalks, are produced from a stout, creeping rhizome (prostrate stem) ; they are bipinnate (twice divided to the midrib), of a soft, papery texture, and of a pale, vivid, shining-green colour. Their lower leaflets, 1ft. to 1½ft. long and about 6in. broad, are cut down into narrow, sharp-pointed pinnules (leafits) with oblong, deeply-pinnatifid segments, the under-surface of which, as well as the rachises (stalks of the leafy portion), are naked or very finely hairy. The sori (spore masses), covered by a cup-shaped involucre, are placed two to twelve to a segment, and disposed at the base of the sinuses (notches).—*Hooker*, *Species Filicum*, i., p. 76. *Nicholson*, *Dictionary of Gardening*, i., p. 467. *Lowe*, *Ferns British and Exotic*, viii., t. 40.

D. cicutaria is very variable in cutting and in texture. Among the different forms found in cultivation may be mentioned *D. dissecta* of Sieber, which is a native of Peru and Guatemala and has barren segments more wedge-shaped and serrated above ; *D.* (*Patania*) *erosa* of Presl, with larger and more hairy pinnules, less deeply lobed and of brighter green colour ; *D. c. incisa* of Baker, with fronds more compound than the type, and with toothed segments four times pinnatifid ; and the Brazilian *D. tenera* of Martius, which is similar in size and habit to the typical plant, but is of a more membranous texture.

D. (Balantium) Culcita—Bal-an′-tĭ-um ; Cul′-cit-a (a cushion), *L'Héritier.*

This very handsome, large-growing, greenhouse species, native of Madeira and the Azores, where it is found at elevations of from 2000ft. to 3000ft., is popularly known under the name of "Cushion Fern," from the fact that its crown and the base of its fronds are covered with a dense, woolly covering of a soft, silky nature, so abundant that it has now become an article of commerce. *D. Culcita* cannot be strictly called a Tree Fern, inasmuch as its trunk seldom, if ever, rises more than a few inches above the ground (Fig. 40), but it is as highly decorative and as effective as any arborescent kind. Its fronds, fully 1½ft. long, 1ft. broad, and tripinnate (three times divided to the midrib), are borne on stout, upright stalks as long again as their leafy portion. The lower pinnules (leafits) are deltoid (in shape of the Greek delta, Δ), and have egg-shaped divisions, cut down to the rachis (stalk) in the lower part, with oblong, unequal-sided, deeply-toothed segments of a leathery texture and wedge-shaped at the base. The fertile fronds are so much contracted that there is very little membrane left between the sori (spore masses), which are one line across and have a singular covering somewhat resembling a purse.—*Hooker*, *Species Filicum*, i., p. 70. *Nicholson*, *Dictionary of Gardening*, i., p. 467. *Lowe*, *Ferns British and Exotic*, viii., t. 39.

Fig. 40. Dicksonia Culcita (much reduced).

D. Culcita, or, as it is most usually called, *Balantium culcita*, is a grand Fern, growing naturally in very swampy places, as is testified by the fact that most of the imported clumps of it arrive here entirely covered with *Hymenophyllum tunbridgense.* Year after year hundreds of crowns or clumps of the Cushion Fern are brought here from their native places, and every time the tiny Filmy Fern is brought with them. Although a very strong

Lomaria Boryana Dalgairnsiæ

(¼ nat. size).

grower, *D. culcita* produces comparatively few roots; these are of a tough, wiry nature, and seem to delight in an open compost made of two parts peat and one part chopped sphagnum, without any sand. The soil should at all times be kept very moist. Although spores are produced in great abundance, we have no knowledge of any young plants having ever been artificially raised in this country, and our personal endeavours in that direction have never met with success.

D. (Patania) cuneata—Pat-an′-ĭ-a; cun-ĕ-a′-ta (wedge-shaped), *Hooker.*

A stove species, native of the Philippine Islands, with ample fronds, sub-deltoid and quadripinnatifid (in shape of the Greek delta, Δ, and four times divided nearly to the midrib). The spear-shaped leaflets, 6in. to 12in. long, are furnished with short-stalked, spear-shaped, and closely-set pinnules (leafits), which in their turn are cut into oblong, stalkless, deeply-cleft segments, wedge-shaped at the base, more cut away on the lower side, and of a moderately firm texture. The abundant sori (spore masses) are disposed at the base of the ultimate sinuses (notches), and covered by cup-shaped involucres.—*Hooker, Species Filicum*, i., p. 80, t. 28G.

D. (Dennstædtia or **Patania) davallioides**—Denn-stæd′-tĭ-a; Pat-an′-ĭ-a; dav-al-lĭ-ŏ-i′-dēs (Davallia-like), *R. Brown.*

This greenhouse species, native of temperate as well as of tropical parts of Australia, is of a loose, elegant habit of growth, and one of the most graceful of the genus. Its fronds, which are abundantly produced from thick, underground rhizomes (prostrate stems), are 2ft. to 4ft. long and of a thinner texture than those of most other species; they are tripinnate (three times divided to the midrib), and their lower leaflets, 6in. to 9in. long and 3in. to 4in. broad, are cut down quite to the rachis (stalk of the leafy portion) into narrow, sharp-pointed pinnules (leafits), which are again divided into oblong segments that are deeply pinnatifid (cleft nearly to the midrib) and slightly hairy on their under-surface. The stalks and rachises are smooth and shining. The sori (spore masses), covered by nearly round, cup-shaped involucres, are disposed two to eight to a segment, and placed at the base of the sinuses (notches).—*Hooker, Species Filicum*, i., p. 71. *Nicholson, Dictionary of Gardening*, i., p. 467. *Lowe, Ferns British and Exotic*, viii., t. 41.

D. d. Youngii—Young′-ĭ-i (Young's), *Moore.*

This highly ornamental variety, originally introduced from the New Hebrides, where it is said to grow in swampy places, is of very robust habit and vigorous growth. Its underground rhizome (prostrate stem) is thick and fleshy, and produces fronds of noble proportions, attaining a length of 10ft., including their stout, erect, quite smooth, green stalks, which are rounded on the under-side and flattened on the upper side, with a furrow extending along their entire length. The leafy portion of the frond is beautifully arching, broadly spear-shaped, terminating in a regular point, and minutely subdivided (see Plate). The spreading leaflets are sessile (stalkless) or nearly so; their rachis (stalk of the leafy portion) is furrowed on the upper side like the stalks, and their finely-cut pinnules (leafits) are of a light, cheerful green colour. The aspect of the whole frond is airy and graceful. It is a grand Fern for a warm conservatory, and is unsurpassed as a central subject in grouping where bold and spreading foliage is required.—*Nicholson, Dictionary of Gardening*, iv., p. 536.

D. (Eudicksonia) Deplanchei — Eu-dick-so′-nĭ-a; Dep-lan′-chĕ-i (Deplanche's), *Vieillard.*

A stove, arborescent species, native of New Caledonia, with ample fronds of rigid, leathery texture, smooth and uniformly green on both sides. It is, however, of little decorative value.—*Hooker, Synopsis Filicum*, p. 462.

D. dissecta—dis-sec′-ta (cut-leaved). A variety of *D. cicutaria.*

D. dubia—dub′-ĭ-a (doubtful). A synonym of *Davallia dubia.*

D. (Patania) Elwesii—Pat-an′-ĭ-a; El-wes′-ĭ-i (Elwes's), *Baker.*

A greenhouse species, of small dimensions, native of Sikkim, and found near Lachen, at 8500ft. elevation. Its spear-shaped, thrice-pinnatifid fronds seldom exceed 1ft. in length and 6in. in breadth; the spear-shaped, nearly stalkless leaflets have their rachis flattened, and are furnished with twenty to thirty pairs of small, stalkless leafits that are wedge-shaped at the base and deeply pinnatifid, thus forming numerous very narrow segments, the tips of which are completely filled up with spore masses in the fertile fronds.—*Hooker, Synopsis Filicum*, p. 54.

D. erosa—e-ro′-sa (bitten). A variety of *D. cicutaria.*

D. (Eudicksonia) fibrosa—Eu-dick-so′-nĭ-a ; fi-bro′-sa (fibrous), *Colenso.*

This fine, greenhouse species, native of New Zealand, and seldom met with in collections, at first sight somewhat resembles the Australian and Tasmanian *D. antarctica.* It is, however, essentially distinct, and is readily distinguished from that species by its trunk, which is much stouter in proportion to its height and covered all over with small, wiry roots, which, instead of descending straight from the crown as in other species, seem to cross each other all over the surface of the trunk. It is also distinguished by its tripinnate fronds, 3ft. to 4ft. long, borne on very short stalks, which are densely covered with short, narrow scales of a bright brown colour. The central leaflets, which are the longest, seldom exceed 9in. in length, and have their narrow, stalkless pinnules (leafits) and their oblong, toothed segments turned upwards at the points, thus giving the whole plant a bristly and rigid appearance. The sori (spore masses), disposed four to six to the largest segments, are much smaller than those of *D. antarctica.*—*Hooker, Species Filicum*, i., p. 68, t. 23B. *Nicholson, Dictionary of Gardening*, i., p. 467.

D. (Patania) flaccida—Pat-an′-ĭ-a ; flac′-cid-a (weak, relaxed), *Swartz.*

A stove species, with tripinnate fronds, native of Aneiteum and the New Hebrides, and very closely related to the better-known *D. rubiginosa*, from which it differs principally in being of a much brighter and more pleasing colour, and in having its rachises (stalks of the leafy portion of the frond) densely woolly throughout.—*Hooker, Species Filicum*, i., p. 77. *Nicholson, Dictionary of Gardening*, i., p. 468.

D. (Cibotium) glauca—Cib-o′-tĭ-um ; glau′-ca (glaucous), *Smith.*

An arborescent, stove species, native of Oahu, Sandwich Islands, and one of comparatively small dimensions. Its broadly-spear-shaped fronds, 1ft. to 1½ft. long and 6in. to 9in. broad, are tripinnate (three times divided to the midrib), their pinnules (leafits) being cut quite down to the rachis (stalk) in the lower part into narrow-oblong and somewhat sickle-shaped lobes ; they are of a somewhat leathery texture, dark green above and glaucous (bluish-green) beneath. The sori (spore masses), disposed two to twelve to a lobe, are covered by a distinctly two-valved involucre, the inner valve being oblong and narrower than the outer one.—*Hooker, Species Filicum*, i., p. 82, t. 29A. *Nicholson, Dictionary of Gardening*, i., p. 468.

D. (Cibotium) guatemalensis — Cib-o′-tĭ-um ; gua-tem-a-len′-sis (from Guatemala), *Baker.*

This is a very strong-growing, arborescent, stove species, having oblong, tripinnate fronds furnished with oblong-spear-shaped leaflets 2ft. or more long and 10in. to 12in. broad. The narrow, sharp-pointed pinnules (leafits), about ¾in. broad, are cut into close, spear-shaped, toothed segments of a somewhat leathery texture and beautifully glaucous (bluish-green) underneath. The very small sori (spore masses) are disposed eight to ten to the largest segments, where they are imbricated (overlapping) and placed obliquely with the edge. —*Hooker*, *Synopsis Filicum*, p. 461.

D. (Patania) Henriettæ — Pat-an′-ĭ-a ; Hen-rĭ-ett′-æ (Miss H. Baker's), *Baker.*

A pretty, stove species, of comparatively small dimensions, native of Antanarivo, in Madagascar. It has somewhat the general appearance of *D. cicutaria incisa*, but the leaflets and pinnules (leafits) are much fewer and diminish rapidly in size up the rachises (stalks). Its fronds, deltoid and quadripinnate (in form of the Greek delta, Δ, and four times divided to the midrib), are borne on short, naked stalks ; their leaflets, also deltoid, are 7in. to 8in. long and furnished with distinctly-stalked pinnules of the same shape, cut down into segments that are wedge-shaped on the lower side at the base, and of moderately firm texture. The sori (spore masses), hemispherical in shape, are placed on the upper side of the ultimate segments.—*Hooker*, *Synopsis Filicum*, p. 462.

D. incisa—in-ci′-sa (cut). A variety of *D. cicutaria.*

D. (Eudicksonia) Lathami — Eu-dick-so′-nĭ-a ; La′-tham-i (Latham's), *Moore.*

This noble, greenhouse Fern is the only instance known at present of an artificially-produced hybrid of arborescent habit. It was raised at the Birmingham Botanic Gardens by Mr. Latham, who states that it is the result of a cross effected between *D. antarctica* and *D. arborescens.* It certainly possesses all the characters of a plant intermediate between these two species, and appears to have retained the exceptionally robust nature of the latter, combined with the elegant character of the former ; for its fronds, tripinnate

(three times divided to the midrib) like those of *D. antarctica*, are of the dark green colour and of the very leathery texture peculiar to the foliage of *D. arborescens*. Its dimensions are also larger than those of the average *D. antarctica*, for the fronds attain 15ft. in length ; the leaflets, stalkless and oblong-spear-shaped, are 1½ft. to 2ft. long, 6in. to 8in. broad, and furnished with close-set, stalkless, spear-shaped, blunt pinnules ; while their segments, instead of being incised or cleft like those of *D. antarctica*, are oblong and more or less lobed like those of *D. arborescens*, and in the case of the fertile ones also conspicuously contracted. The stalks and rachises (stalks of the leafy portion) of the fronds are, like those of *D. arborescens*, woolly or scaly throughout, the main ones being densely clothed at the base with narrow scales of a bright rusty-brown colour. The sori (spore masses), which are large and nearly spherical, like those of *D. arborescens*, are disposed four to eight to a lobe and occupy only the basal portion of the fertile leaflets, two-thirds of which, in their upper part, usually remain barren.—*Nicholson, Dictionary of Gardening*, iv., p. 536.

Fig. 41. Dicksonia Menziesii (much reduced).

D. Lindeni—Lin′-den-i (Linden's). Synonymous with *D. Plumieri.*

D. magnifica—mag-nif′-ic-a (magnificent). A synonym of *D. chrysotricha.*

D. (Cibotium) Menziesii—Cib-o′-tĭ-um ; Men-zies′-ĭ-i (Menzies'), *Hooker and Baker.*

A very handsome, stove Fern, of erect growth, but scarcely arborescent, native of Oahu and Honolulu, Sandwich Islands, and very rarely met with in collections. Its handsome, massive fronds, produced from a short, upright trunk (Fig. 41), are tripinnate (three times divided to the midrib) and somewhat triangular in shape. The lower leaflets, which are the largest, measure

1ft. to 1½ft. in length and 6in. to 9in. in breadth, and are furnished with long and sharp-pointed pinnules (leafits) that are usually cut down not more than half-way to the rachis (stalk); they are of a somewhat leathery texture and have blunt, rounded lobes; their surface is naked on both sides, the whole of the frond being of a beautiful dark green colour, shining when perfectly mature, and not glaucous (bluish-green) beneath. The stalks, which are strong, nearly erect, and almost as long again as the leafy portion, are clothed all over with short, woolly-looking, dun-coloured hairs. The sparingly-produced sori (spore masses) are disposed two to eight to each fertile pinnule, on which they are disposed in rows with a broad space between them.—*Hooker*, *Species Filicum*, i., p. 84, t. 29G. *Nicholson*, *Dictionary of Gardening*, i., p. 468.

D. M. pruinata—prŭ-i-na′-ta (appearing as if hoar-frosted), *Baker*.

This variety, usually found in gardens under the name of *Cibotium pruinatum*, is distinguished from the typical plant by the under-surface of its fronds being beautifully glaucous (bluish-green), and by the lobes of the pinnules being distinctly denticulate (or toothed), instead of blunt and rounded.

D. (Patania) moluccana—Pat-an′-ĭ-a; mol-uc-ca′-na (from the Moluccas), *Blume*.

A distinct, warm-greenhouse Fern, somewhat resembling *D. rubiginosa* in habit, and a native of the mountains of the Moluccas, as its specific name indicates. Its fronds, tripinnate (three times divided to the midrib) and somewhat elongated-triangular in shape, are borne on stalks that are thickly furnished with strong, hooked prickles. The lower leaflets, which are the longest, measure 1ft. to 1½ft. in length and 6in. to 9in. in breadth. The narrow-spear-shaped pinnules (leafits) are cut down to the rachis (stalk) throughout, their lower segments being cut down to the rachis in the lower part only, and having blunt, oblong lobes, each of which bears from two to twelve spore masses when fertile.—*Hooker*, *Species Filicum*, i., p. 78. *Nicholson*, *Dictionary of Gardening*, i., p. 468. *Lowe*, *Ferns British and Exotic*, viii., t. 46.

D. pilosiuscula — pil-o-sĭ-us′-cul-a (slightly hairy). Synonymous with *D. punctiloba*.

D. (Eudicksonia) Plumieri—Eu-dick-so′-nĭ-a ; Plu-mĭ-e′-ri (Plumier's), *Hooker.*

A large-growing, stove species, native of the West Indian Islands and Columbia, and also known as *D. Lindeni.* Its ample fronds are bipinnate (twice divided to the midrib) and of a soft, papery texture. The lower leaflets, 1ft. to 1½ft. long and 6in. to 9in. broad, have their lower pinnules (leaflits) 6in. to 8in. long and 2in. to 3in. broad, cut down at the lower part of the rachis (stalk) into broadly-toothed segments ; their upper pinnules, which are much narrower, are slightly lobed only. The sori (spore masses), disposed two to twenty to a segment, are covered with a small, nearly round, deeply two-valved involucre of a membranous (parchment-like) texture, the outer valve at length forming a sort of hood.—*Hooker*, *Species Filicum*, i., p. 72.

D. pruinata—prŭ-i-na′-ta (hoar-frosted). A variety of *D. Menziesii.*

D. (Dennstædtia) punctiloba—Denn-stæd′-tĭ-a ; punc-til′-ob-a (dotted-lobed), *Hooker.*

This very interesting, deciduous species is the only one of the entire genus which is perfectly hardy. It is a native of North America, where, according to Eaton, it is known under the popular names of "Hairy Dicksonia" and also of "Hay-scented Fern," being deliciously fragrant, especially when dried. In its native habitats it is found growing in moist woods and often in low, grassy places ; it is a common Fern in New Brunswick, Canada, New England, and the middle States of North America, extending westward to Indiana and possibly farther, and southward as far as Central Alabama, where it has been found on the cliffs of the Cohaba River. Its very elegant fronds, 1ft. to 1½ft. long, 6in. to 9in. broad, and bipinnate (twice divided to the midrib), are abundantly produced from slender rhizomes (prostrate stems) which creep extensively an inch or two below the surface of the ground : these are about ¼in. thick, perfectly round, nearly naked, and bear, instead of chaff or scales, a very scanty covering of slender, jointed hairs at their growing extremity. The form of the fronds, which are borne on short and slightly hairy stalks, is broadly spear-shaped ; they are of a pleasing pale green colour and of a delicate, soft texture, often bleaching very prettily in autumn. The upper surface is nearly smooth, but the under-side

is minutely glandular and sometimes finely hairy. The leaflets repeat in miniature the outline of the entire frond, the largest being 4in. to 6in. long and cut quite down to the rachis (stalk) except at the top; their pinnules (leafits), ½in. to 1in. long, are deeply pinnatifid (cleft nearly to the midrib). The fertile fronds usually bear fructification on their upper part only, their lower leaflets being usually sterile. The sori (spore masses) are very minute and disposed two to twenty to a pinnule, being placed usually on the lowest tooth on the upper side of the lobes, usually one to a lobe, and covered by a cup-like and not two-valved involucre. The habit of the plant is rather erect and similar to that of *Asplenium Filix-fœmina*, differing in that respect from all the other species of *Dicksonia*, even the strongest-growing kinds of which are all of a more or less arching habit. It is the *Nephrodium punctilobulum* of Michaux, published in 1803; the *Aspidium punctilobulum* of Swartz, 1806; and the *Dicksonia pilosiuscula* of Willdenow, 1809.—*Hooker*, *Species Filicum*, i., p. 79. *Nicholson*, *Dictionary of Gardening*, i., p. 468. *Lowe*, *Ferns British and Exotic*, viii., t. 42. *Eaton*, *Ferns of North America*, i., t. 44.

D. (Cibotium) regalis—Cib-o′-tĭ-um; re-ga′-lis (regal), *Baker*.

This gigantic-growing, stove species, native of Mexico, though undoubtedly of an arborescent character, is very slow in producing a trunk. Its large and elegantly-arching fronds, oblong-triangular in shape and tripinnate (three times divided to the midrib), often attain the length of 12ft., including the strong, erect, slightly hairy stalks on which they are borne; they are furnished with leaflets 1½ft. to 2ft. long and 10in. to 12in. broad, which are subdivided into sessile pinnules (stalkless leafits). The pinnules are cut down to the rachis (stalk), or to a narrow wing, into close, spear-shaped, and deeply-cleft segments, each of which bears ten to twelve spore masses disposed parallel with the edge.—*Hooker*, *Synopsis Filicum*, p. 461. *Nicholson*, *Dictionary of Gardening*, i., p. 468.

D. (Patania) rubiginosa—Pat-an′-ĭ-a; ru-bi-gin-o′-sa (rusty), *Kaulfuss*.

This singular, stove species, of straggling habit, is a native of Tropical America, from Mexico and the West Indies to Brazil (Rio Janeiro, Téjuca, and Bahia), Columbia, and Peru. Its fronds, of a soft, papery texture and

darkish green in colour, are produced from a creeping rhizome (prostrate stem); they are tripinnate (three times divided to the midrib) and about 3ft. long, with lower leaflets 1ft. to 1½ft. long and 6in. to 9in. broad. The narrow leafits are cut quite to the rachis (stalk of the leafy portion) throughout into triangular or oblong, pinnately-cleft segments that are rounded at their extremity. The stalks, rachises, and under-surface of the fronds are finely hairy. The sori (spore masses), which are remarkably small for a Dicksonia, are disposed two to twelve to a segment, being placed at the base of the notches and covered with a cup-shaped involucre.—*Hooker*, *Species Filicum*, i., p. 29, t. 27A. *Nicholson*, *Dictionary of Gardening*, i., p. 468. *Lowe*, *Ferns British and Exotic*, viii., t. 45.

D. r. anthriscifolia—an-thris′-cif-ol′-ĭ-a (Anthriscus-leaved), *Kaulfuss.*

A variety of the preceding species, from which it differs through having its segments larger and more divided, and also through the rachises and under-surface of its fronds being nearly naked.—*Hooker*, *Species Filicum*, i., p. 79, t. 27B.

D. (Sitolobium) samoensis—Si-tol-ob′-ĭ-um; sa-mo-en′-sis (from Samoa), *Baker.*

A stove species, closely resembling the better-known *D. cuneata*, with which it agrees in size as also in habit and divisions of the fronds.—*Hooker*, *Species Filicum*, p. 462.

D. (Patania) scabra—Pat-an′-ĭ-a; scab′-ra (rough), *Wallich.*

A stove species, native of the Himalayas, Ceylon, and the Malayan Peninsula, and usually found in gardens under the name of *Sitolobium strigosum.* Its triangular or spear-shaped fronds, borne on stalks about 1ft. long, rough and very hairy below, are produced from a wide-creeping rhizome (prostrate stem); they are bipinnate (twice divided to the midrib), 20in. to 30in. long, and 6in. to 2ft. broad. The lower leaflets, 4in. to 8in. long and spear-shaped, have their pinnules (leafits) quite distinct, the lower ones cut down nearly to the stalk into numerous pinnatifid segments of a soft, papery texture and more or less hairy on their under-surface. The sori (spore masses), covered by a cup-shaped involucre, are disposed two to six to the lower segments.—*Hooker*, *Species Filicum*, i., p. 80, t. 27B.

D. (Cibotium) Schiedei—Cib-o′-tĭ-um ; Schie′-dĕ-i (Schiede's), *Baker*.

One of the handsomest of all known arborescent Ferns, and very distinct. Though it thrives fairly well in a conservatory, it prefers stove temperature, being a native of Guatemala and of Mexico, in the warm temperate regions of which latter country Liebmann says it is found at elevations varying between 2000ft. and 4000ft. above the level of the sea. According to Galeotti, who found it at Jalapa, its handsome trunk reaches the height of 15ft. ; but although of free-growing habit, plants with such trunks must be many years old, as the formation of the trunk in this case is a slow process. With the exception of the unique specimen in the conservatory at Chatsworth, plants in cultivation with trunks more than 2ft. high are seldom met with. The very elegantly-drooping fronds, oblong-triangular in shape, are frequently seen measuring from 6ft. to 10ft. in length. They are tripinnate (three times divided to the midrib), are borne on stout, brownish stalks of a very hairy nature, and rise from a crown that is densely covered with long, silky, shining, brown hairs. The oblong-spear-shaped leaflets, 1ft. to 2ft. long and ending in a very narrow point, are furnished with short-stalked, narrow pinnules (leafits) cut down quite to the rachis (stalk) below ; these are again subdivided into closely-set, somewhat sickle-shaped, toothed segments, upon each of which four to six spore masses are disposed parallel with the edge. The sori are peculiar, inasmuch as the inner valve of the involucre overtops the outer one. This species is highly decorative, and all the more attractive as its fronds, of a somewhat leathery texture, are of a pale yellowish-green above and beneath very glaucous (bluish-grey), with which the colour of the conspicuous spore masses forms a pleasing contrast.—*Hooker*, *Species Filicum*, i., p. 84, t. 30A. *Nicholson*, *Dictionary of Gardening*, i., p. 468. *Lowe*, *Ferns British and Exotic*, viii., t. 35.

D. (Eudicksonia) Sellowiana—Eu-dick-so′-nĭ-a ; Sel-lo-wĭ-a′-na (Sellow's), *Hooker*.

This very distinct, arborescent, stove species, native of South Brazil, is also known as *D. Spruceana*. Its fronds are 6ft. to 8ft. long, 2ft. to 3ft. broad, broadly spear-shaped, and bipinnate (twice divided to the midrib). The lower leaflets, 1ft. to 1½ft. long and 3in. to 4in. broad, are furnished with

linear pinnules (long and narrow leafits) cut quite down to the stalk in the lower part ; these have oblong-triangular, closely-set, sharp-pointed segments. The fertile pinnules are slightly contracted, and the sori (spore masses), covered with nearly orbicular involucres, are disposed two to six to each fertile segment or lobe.—*Hooker*, *Species Filicum*, i., p. 67, t. 22B. *Nicholson*, *Dictionary of Gardening*, i., p. 468.

D. (Cibotium) speciosa—Cib-o′-tĭ-um ; spec-ĭ-o′-sa (showy). A synonym of *D. chrysotricha.*

D. (Cibotium) spectabilis — Cib-o′-tĭ-um ; spec-ta′-bil-is (showy). A common garden name for *D. Wendlandii.*

D. Spruceana—Spru-cĕ-a′-na (Spruce's). Synonymous with *D. Sellowiana.*

D. (Eudicksonia) squarrosa — Eu-dick-so′-nĭ-a ; squar-ro′-sa (rough-stemmed), *Swartz.*

A very handsome, arborescent, greenhouse species, native of New Zealand and Chatham Island. It is particularly attractive on account of its slender, black or very dark-coloured trunk, which frequently produces young plants on its surface. The habit of its head is also peculiar and very effective : it is quite tabulæforme (flat), and is formed of a quantity of rigid, leathery fronds, dark shining green on their upper surface, paler beneath, and borne on short and comparatively slender, dark purplish or blackish stalks that are covered with raised points and blackish hairs. These fronds are oblong-triangular and tripinnate (three times divided to the midrib) ; their numerous oblong-spear-shaped leaflets, 9in. to 15in. long and 4in. to 6in. broad, are furnished with nearly stalkless pinnules (leafits), which in their turn are divided into spear-shaped segments, the barren ones toothed, the fertile ones much smaller, deeply pinnatifid, and contracted. The sori (spore masses) are disposed six to eight on the lower segments, the whole of which they occupy, with the exception of the midrib and the tip. The trunk of this species, being naturally of a very dry nature, must be carefully kept moist.—*Hooker*, *Species Filicum*, p. 68. *Nicholson*, *Dictionary of Gardening*, i., p. 468. *Lowe*, *Ferns British and Exotic*, viii., t. 44.

D. strigosa—strig-o′-sa (roughly hairy). Synonymous with *D. scabra.*

D. tenera—ten′-er-a (tender). A variety of *D. cicutaria.*

D. (Eudicksonia) thyrsopteroides—Eu-dick-so′-nĭ-a ; thyr-sop-ter-ŏ-i′-dēs (Thyrsopteris-like), *Mettenius.*

A stove, arborescent species, of large size, native of New Caledonia, where, according to Vieillard, its trunk attains a height of from 24ft. to 30ft. Its ample fronds are tripinnatifid (three times divided half-way to the midrib) and have their central leaflets oblong-spear-shaped, 1ft. to 1¼ft. long, 4in. to 5in. broad, furnished with close, ascending, ligulate and sessile pinnules (strap-shaped and stalkless leafits) ½in. broad, cut down to a narrow wing. The close and toothed barren segments differ from the fertile ones (which are reduced to the stalk), and bear six to eight spore masses covered by round and firm involucres.—*Hooker*, *Synopsis Filicum*, p. 462.

D. (Cibotium) Wendlandii—Cib-o′-tĭ-um ; Wend-land′-ĭ-i (Wendland's), *Baker.*

This stove species, better known in gardens under the name of *Cibotium spectabile*, is a native of Guatemala and Mexico, and in general appearance is closely related to *D. regalis*, from which it is readily distinguished by its more upright habit and its narrow fronds, which are slightly hairy all over their under-surface and uniformly green. The silky hairs which abundantly cover the crown and the stalks are also of a much lighter colour than those of *D. spectabilis ;* otherwise its fronds are of the same oblong-triangular shape, of a similar leathery texture, and, like those of that species, subdivided into sessile pinnules (stalkless leafits) and closely-set segments, upon which the sori, four to eight to a segment, are disposed parallel with the edge, being covered by an involucre with equal valves.—*Hooker*, *Synopsis Filicum*, p. 460. *Nicholson*, *Dictionary of Gardening*, i., p. 468.

D. (Eudicksonia) Youngiæ—Eu-dick-so′-nĭ-a ; Young′-ĭ-æ (Mrs. Young's), *C. Moore.*

This greenhouse species, native of New South Wales, somewhat resembles the better-known *D. squarrosa;* but its trunk, which, like that of that species, possesses the peculiarity of producing young plants on its surface, is more slender still and of a brighter colour. The fronds, of the same oblong-triangular shape and tripinnate (three times divided to the midrib), are borne

on stalks, 6in. to 9in. long, that are densely clothed with firm, bristly scales ¼in. long, and of a very effective, bright light-brown colour. These fronds are of the same rigidly-coriaceous texture, and their segments, like those of *D. squarrosa*, are spear-shaped and toothed when barren and deeply cleft and contracted when fertile. The sori (spore masses) are disposed six to eight to the lower segments and covered by an involucre with round, hard valves of a smooth nature.—*Hooker*, *Synopsis Filicum*, p. 461. *Nicholson*, *Dictionary of Gardening*, i., p. 468.

DICTYMIA—Dic-tym′-ĭ-a. *See* **Polypodium.**

DICTYOGRAMME—Dic-tў-og-ram′-me. *See* **Gymnogramme.**

DICTYOPTERIS—Dic-tў-op′-ter-is. *See* **Polypodium.**

CHAPTER XV.

DICTYOXIPHIUM, *Hooker.*

(Dic-tў-ox-iph′-ĭ-um.)

IN Hooker and Baker's "Synopsis Filicum" this monotypic genus, which derives its name from *dictyon*, a net, and *xiphos*, a sword (in allusion to the form of its sword-shaped fronds with netted veins), forms Genus 20. It is closely allied to *Lindsaya*, the sori (spore masses) being, as in that genus, marginal and continuous; the two-valved involucre also is similar, but differs, inasmuch as its outer valve is obsolete.

Culture.

A compost of two parts peat or leaf mould, one of rich fibrous loam, and one of sand is that which best suits *D. panamense*. It must at all times of the year be liberally watered at the roots. Though averse to bright sunlight, the plant requires very little shading. Propagation is effected by division of the crowns.

D. panamense—pan-am-en′-sĕ (native of Panama), *Hooker.*

The habitat of this very singular, stove, evergreen species, appears to be restricted to the Isthmus of Panama, where it was found by Cuming, and to New Grenada, where Purdie discovered it. The plant has quite entire fronds, which, either barren or fertile, are 2ft. to 3ft. long, sessile (stalkless), and

somewhat erect in habit; the barren ones are 2in. to 3in. broad, the fertile ones ½in. to 1in. broad, and they are narrowed gradually from the middle downwards. Both kinds are produced from a stout, erect, fasciculate (bundle-like) rhizome, and are of a leathery texture; their midrib is strong, prominent, and conspicuously scaly. The spore masses are disposed in an uninterrupted, marginal line, and when the involucre is rolled over them they appear as if placed on the upper surface of the frond.—*Hooker*, *Species Filicum*, i., p. 224. *Nicholson*, *Dictionary of Gardening*, i., p. 471. *Lowe*, *Ferns British and Exotic*, viii., t. 69.

CHAPTER XVI.

DIDYMOCHLÆNA, *Desvaux.*

(Did-ym-och-læ′-na.)

ONLY a couple of species—those here described—are embraced in this genus. The name is derived from *didymos*, twin, and *chlaina*, a cloak, in reference to the involucre or covering of the sori (spore masses), which is elliptical, emarginate (having a notch) at the base, attached to the narrow receptacle, but free all round the edge. The sori are of the same elliptical shape as their covering, terminal on a veinlet, but distinctly intramarginal (placed within the margin of the pinnules of the fertile fronds). *Didymochlæna* forms in Hooker and Baker's "Synopsis Filicum" Genus 42, and is a sub-division of the Tribe *Aspidieæ*. Both the species are of arborescent habit, forming trunks of small dimensions.

Culture.

Didymochlænas are very ornamental, stove Ferns, and especially is this the case with *D. lunulata*, which is most commonly met with in collections. They are of easy cultivation, although it is nothing unusual to see their pinnules (leafits) fall of, leaving the stalks naked; that generally happens when the plants have suffered from want of water at the roots; but although unsightly for a time when in such condition, they soon recover under liberal treatment. The plants should be potted in a mixture of two parts of good fibrous peat and one of loam, with a good dash of silver sand, and be

Davallia fijiensis plumosa

(¼ nat. size).

thoroughly well drained; although they naturally grow in places that are constantly moist, stagnancy at the roots must be carefully avoided. The spores, which are produced in abundance, germinate freely, and produce young plants in a remarkably short space of time.

Fig. 42. Pinna of Didymochlæna lunulata (⅔ nat. size).

Species and Variety.

D. lunulata — lu-nul-a′-ta (crescent-shaped), *Desvaux.*

This very handsome, stove Fern, extensively known in gardens also under the name of *D. truncatula*, is a native of Tropical America, from Cuba and Guatemala to Peru and Brazil, also of the Fiji and Malayan Islands, Madagascar, &c. It is hardly arborescent enough to be called a Tree Fern: although it forms a trunk, this never attains any great height under cultivation. It is very thick, and seldom exceeds a few inches high, but it abundantly produces its massive and highly decorative fronds 4ft. to 6ft. long. These fronds are borne on short stalks, which, like the midrib of the leaflets, are densely clothed with long, brown, chaffy scales; they are bipinnate (twice divided to the midrib) and broadly spear-shaped. The leaflets (Fig. 42), 8in. to 10in. long, are sessile (stalkless), and furnished with more or less crescent-shaped pinnules (leafits) ¾in. to 1in. broad, of a leathery texture, with their margin either smooth or slightly

notched, and articulated with the rachis (stalk of the leafy portion). The sori (spore masses) are disposed from two to six to a pinnule.—*Hooker*, *Species Filicum*, iv., p. 5. *Nicholson*, *Dictionary of Gardening*, i., p. 472. *Lowe*, *Ferns British and Exotic*, vi., t. 4. *Beddome*, *Ferns of British India*, t. 15.

D. lunulata is entirely distinct from any other Fern in cultivation, its general aspect being that of an arborescent Adiantum, for its pinnules are shaped like those of several Maidenhair Ferns, and the bright metallic colour which adorns its fronds in their young stage helps to make the illusion more complete. The fronds are, however, provided with thick, fleshy stalks, and their leafy portion, at first of a crimson-bronze tint, which gradually turns to a vivid, glossy green, are of a fleshy texture unknown among Adiantums, to which the resemblance is thus much more apparent than real. This Fern might be extensively used for outdoor sub-tropical decorations from mid-June to mid-September, the experiments which have been tried in that respect in France and in Belgium having proved very satisfactory. It has a very disagreeable way of losing its pinnules; but these drop off only when the plant has been allowed to get dry at the roots.

D. polycarpa—pol-yc-ar′-pa (many-fruited), *Baker*.

In habit this stove species resembles a Nephrodium, but its involucre is similar in structure to that of the foregoing species. It is a native of the Malayan Peninsula and Islands, and has an upright trunk from which its fronds, simply pinnate (only once divided to the midrib), 2ft. to 3ft. long, and 1ft. to 1½ft. broad, are produced. These fronds are furnished with numerous leaflets, closely set and of a soft, papery texture, the largest of which are 6in. to 9in. long and ½in. broad; but they gradually dwindle down to mere auricles towards the bottom of the fronds, and are cut down about half-way to the rachis into close, linear-oblong lobes. The sori (spore masses) are closely disposed upon the lobes, and eventually become confluent.—*Hooker*, *Species Filicum*, iv., p. 67. *Nicholson*, *Dictionary of Gardening*, i., p. 472.

D. p. asplenioides—as-ple′-nĭ-ŏ-i′-dēs (Asplenium-like).

A hairy form of the species, from which it is distinguished not only by its villous nature, but also by the narrow shape of its leaflets and the short,

oblong-triangular lobes into which they are cut, especially in the upper portion of the fronds. It is also known as *Mesochlæna asplenioides* of J. Smith.—*Hooker, Synopsis Filicum*, p. 248. *Nicholson, Dictionary of Gardening*, i., p. 472.

D. truncatula—trun-ca′-tul-a (terminating rather abruptly). A synonym of *D. lunulata*.

DIELLIA—Dĭ-el′-lĭ-a. *See* **Lindsaya.**

DIPLAZIUM—Dip-laz′-ĭ-um. *See* **Asplenium.**

CHAPTER XVII.

DIPLORA, *Baker.*

(Dip-lo′-ra.)

THIS genus, which comprises but one known species, has been created by Baker, who makes it a sub-division of the genus *Asplenium*, and in the "Synopsis Filicum," p. 492, has it as Genus 38*. The name is derived from *diploos*, double, and *lora*, thongs, in allusion to the strap-shaped valves of the involucre. *Diplora* is distinct on account of its sausage-shaped sori (spore masses), which run up the simple vein from the midrib of the frond to its margin. The involucres (coverings of the sori) are also very peculiar, as they are formed of two equal, narrowly-strap-shaped valves, meeting in the middle over the raised vein and bursting open as the spore masses mature.

Culture.

D. integrifolia succeeds well under the treatment recommended for *Asplenium*. It may be increased by means of its spores, which are abundantly produced and germinate freely.

D. integrifolia—in-teg-rif-ol′-ĭ-a (having entire fronds), *Baker*.

In habit, as also in mode of growth, this stove species, native of the Solomon Islands, is similar to *Asplenium vittæforme*. Its entire (undivided) fronds, linear-ligulate (narrowly-strap-shaped), of a parchment-like texture, and

of a uniform green colour on both surfaces, are produced from a wide-creeping, green, woody rhizome (prostrate stem), and borne on naked, greenish stalks scarcely 1in. long and articulated at the base. The leafy portion of the fronds, although usually 9in. to 10in. long, is seldom more than ½in. broad, and narrowed to both ends. The conspicuous sori (spore masses), ¼in. to ½in. long, are disposed from fifty to sixty on each side of the midrib.—*Hooker*, *Synopsis Filicum*, p. 492.

DIPTERIS—Dip′-ter-is. *See* **Polypodium.**

CHAPTER XVIII.

DOODIA, *R. Brown.*

(Doo′-dĭ-a.)

TO Samuel Doody, a London apothecary and botanist, this small genus, composed entirely of plants of dwarf habit, was dedicated by R. Brown ; it is a division of the tribe *Blechneæ*, and forms, in Hooker and Baker's "Synopsis Filicum," Genus 37. Doodias are confined to the islands from Ceylon eastward to Fiji, New Zealand, and Australia ; there is no representative in Britain. The fronds of all the species at present known are either pinnate or pinnatifid (divided wholly or partly to the midrib), and are from 6in. to 18in. long ; their veins form one or two series of arches between the midrib and the edge, on which the sori (spore masses) are placed. The sori are oblong in shape or slightly incurved, superficial, and placed in one or more rows parallel with and between the midribs and margins of the pinnæ (leaflets) ; they are covered by an involucre of the same shape as the sorus, and of a membranous (parchment-like) texture. Several kinds which in commerce hold specific rank are but forms of the more distinct species.

Culture.

Although not an extensive genus, *Doodia* is very rich in decorative Ferns of small habit, as, with the exception of *D. blechnoides*, all the species and varieties which it contains are of dwarf growth ; they are, nevertheless, found very useful, especially for Fern-cases and for edgings of window-boxes

filled with taller-growing kinds, as one often sees now in London houses on north and north-east aspects, where they replace with advantage flowering plants, which cannot be expected to prosper under such unfavourable conditions. Although some Doodias grow more luxuriantly in a stove temperature, and produce more massive foliage under such treatment, none of them actually require great heat; the cool and intermediate houses are the places suitable to all of them. They are also very useful for forming an undergrowth in cool houses devoted to either Orchids, Palms, or flowering subjects; the more so as they are a class of naturally clean plants, being seldom infested with insects, and they bear fumigating without injury. As they are of a very accommodating nature, Doodias, when planted under or grown amongst other plants, bear with impunity the syringings that may be found necessary to the welfare of the latter, or do equally well without, as the case may be. They should be potted in a compost of three parts of peat and one of silver sand. We have never seen them derive any benefit from loam being added to their compost, whereas a little chopped sphagnum forms a valuable addition to their soil, in which case I have always noticed that their fronds attain a fuller development. The drainage, especially when they are grown in pots, must not be overlooked, as they are very sensitive to the effects of stagnant water. None of them like exposure to the full rays of the sun.

Doodias are invariably propagated by means of their spores, which are produced in abundance, and germinate very freely, but they may also be increased by the division of the crowns in early spring.

Principal Species and Varieties.

D. aspera—as′-per-a (rough), *R. Brown.*

This pretty, evergreen, greenhouse species, of erect habit, is a native of Temperate Australia. It is easily distinguished from all other known species by the harsh and rigid nature of the dark-coloured stalks of its fronds. The fronds, which are abundantly produced from a short-creeping rhizome (prostrate stem), are oblong-spear-shaped, 6in. to 18in. long, 2in. to 4in. broad, and pinnatifid (divided half-way to the midrib); the numerous long and narrow leaflets have their margins strongly toothed and their base dilated, the lower ones dwindling to mere auricles. They are of a particularly

tough texture, and while in a young state, and until quite developed, are of a very beautiful purplish-metallic hue, which gradually turns to the darkest green. The sori (spore masses), oblong in shape and about their own length apart, are disposed in one or two rows, the inner situated at a short distance from the midrib.—*Hooker*, *Species Filicum*, iii., p. 71. *Nicholson*, *Dictionary of Gardening*, i., p. 486. *Lowe*, *Ferns British and Exotic*, iv., t. 30.

This very useful species has produced two remarkably pretty and distinct varieties as follow:

D. a. corymbifera—cor-ymb-if′-er-a (corymb-bearing).

A garden form, for the name of which we can find no authority. It is of stiff, erect habit, with fronds seldom attaining more than half the dimensions of those of the typical plant, and densely crested at their extremity, resembling in that respect some of the many interesting forms of our native *Asplenium Filix-fœmina*.—*Nicholson*, *Dictionary of Gardening*, i., p. 486.

D. a. multifida—mul-tif′-id-a (much-cleft), *Moore*.

In this variety, the fronds, instead of being of erect habit, like those of the species, are elegantly drooping, and instead of being densely crested, like those of the foregoing variety, are several times forked at their extremity (Fig. 43); their leaflets show the same character.—*Nicholson*, *Dictionary of Gardening*, iv., p. 537.

In both the above varieties, the latter of which reproduces itself freely and true from spores, the foliage, of a beautiful claret colour when young, gradually assumes a copper tint and changes to a dark green with age.

D. blechnoides—blēch-nŏ-i′-dēs (Blechnum-like), *Cunningham*.

This evergreen, greenhouse species, which is the most sturdy-growing member of the whole genus, is a native of New South Wales. Its fronds, which are produced from an erect rhizome forming a short trunk, are borne on erect stalks 3in. to 4in. long and completely buried under black, rough scales. They are broadly spear-shaped and pinnatifid, their leaflets never being divided quite to the midrib. These leaflets are about 3in. long and ¼in. broad; their margins are sharply toothed, their base dilated, and in

nearly all plants found under cultivation they dwindle into mere auricles towards the base of the fronds—a character which is not apparent in specimens gathered in a wild state. The fronds, of a dull, heavy green colour, are of a leathery texture, and frequently signs of variegation are shown by streaks of pinkish colour, extending from the midrib to the margin

Fig. 43. Doodia aspera multifida
(¼ nat. size).

of the leaflets. The oblong sori (spore masses) are disposed in a rather irregular row, close to the midrib.—*Hooker*, *Species Filicum*, iii., p. 72. *Nicholson*, *Dictionary of Gardening*, i., p. 486. *Lowe*, *Ferns British and Exotic*, iv., t. 32.

D. Brackenridgei—Brack-en-ridg′-ĕ-i (Brackenridge's). A variety of *D. media*.

D. caudata—cau-da′-ta (tailed), *R. Brown.*

An easily-cultivated, greenhouse species, which comes up readily in crevices and on pots in all Ferneries where one plant of it has been once introduced; it is a native of Australia, Tasmania, and New Zealand. Speaking of this plant, Dr. Hooker, in his "Flora of New Zealand," says: "It is very closely allied to *D. media*, and probably a variety of it, but more flaccid, the fronds often prostrate, pinnate nearly to the top, fertile more distinct from the barren, and longer." In the cultivated plants, the fronds, 6in. to 12in. long and 1½in. to 2in. broad, are borne on green, slender, smooth stalks 4in. to 6in. long; the barren ones are drooping and furnished with oblong, blunt leaflets of a soft texture, closely set, and sharply toothed. The fertile ones are also pinnate (divided to the midrib), but erect, and their leaflets are totally different, for they are contracted, auricled at the base, narrow-spear-shaped, and set far apart; their terminal leaflet, which is also fertile and contracted, frequently forms a tail-like process measuring from 1½in. to 2in. long.—*Hooker*, *Species Filicum*, iii., p. 75. *Nicholson*, *Dictionary of Gardening*, i., p. 486. *Lowe*, *Ferns British and Exotic*, iv., t. 31A.

Although the commonest kind known, this is one of the most useful of all Doodias; it is the best for Fern-cases, as also for growing under plants of any sort where a green background is requisite. It is also useful for planting on the walls or in crevices in the rockwork, where it displays its pretty, wavy foliage to great advantage. Two distinct varieties are known in cultivation; these are:

D. c. confluens—con′-flŭ-ens (confluent), *Moore.*

The same plant as *D. linearis* of J. Smith. It differs from the typical plant in having narrow-linear fronds, the upper part of which is undivided, while only the lower third is sinuate and pinnatifid (divided half-way to the midrib); their lobes are rounded, and the lowest ones are very distinct. It is a native of New Caledonia and Australia.—*Hooker*, *Synopsis Filicum*, p. 190. *Nicholson*, *Dictionary of Gardening*, i., p. 486.

D. c. Harryana—Har-ry-a′-na (Harry Veitch's), *Moore.*

This garden-raised variety differs from *D. caudata* in being altogether of larger dimensions, its fronds being stouter and of firmer texture. It may be

said to hold an intermediate position between that species and *D. media.*—*Nicholson, Dictionary of Gardening*, iv., p. 537.

D. connexa—con-nex′-a (connected). A variety of *D. media.*

D. dives—di′-ves (rich), *Kunze.*

This is the tallest-growing species known in the genus; it is a native of Ceylon and Java, which sufficiently accounts for its thriving best in a temperature a little warmer than other Doodias. Its fronds are borne on slender, upright stalks 6in. to 12in. long, smooth in their upper portion, but clothed towards the base with dark-coloured, narrow scales. The barren ones, about 1ft. long and 3in. to 5in. broad, are oblong-spear-shaped and pinnatifid (divided half-way to the midrib), being furnished on each side of the midrib with numerous spreading leaflets 2in. to 3in. long, blunt at the point, undulated and finely toothed on the margins, and suddenly dilated at the base; these are of a coriaceous (leathery) texture, and all except the lowest are connected. The fertile fronds are longer and furnished with very narrow leaflets, the central ones being disposed 1in. apart; they are connected by a broad wing joining the rachis (stalk of the leafy portion). The sori (spore masses) are narrow-oblong and disposed in two irregular rows nearer the midrib than the edge of the leaflets.—*Hooker, Species Filicum*, iii., p. 74. *Nicholson, Dictionary of Gardening*, i., p. 486. *Beddome, Ferns of Southern India*, t. 222.

D. duriuscula—du-rĭ-us′-cul-a (rather hard). A form of *D. media.*

D. Harryana—Har-ry-a′-na (Harry Veitch's). A variety of *D. caudata.*

D. Kunthiana—Kunth-ĭ-a′-na (Kunth's). A variety of *D. media.*

D. linearis—li-nĕ-a′-ris (long and narrow). Synonymous with *D. caudata confluens.*

D. lunulata—lu-nul-a′-ta (crescent-shaped). A synonym of *D. media.*

D. media—med′-ĭ-a (middle or medium), *R. Brown.*

A very pretty, greenhouse species, native of Australia and New Zealand, and also known as *D. lunulata.* It has spear-shaped fronds 1ft. to 1½ft. long, 1½in. to 3in. broad, and borne on slender, smooth stalks of a delicate pink

colour, 4in. to 6in. long, and scaly at the base. These fronds, which when young are of a delicate red colour, are of a more slender and pendulous habit than those of any other Doodia. They are furnished with numerous narrow leaflets, which in the barren ones are usually bluntish at the point and finely toothed at the margins (Fig. 44); the upper ones are dilated and connected at the base, while those below the middle are heart-shaped and even auricled on the upper side. The fertile fronds, which are usually longer, have their leaflets much narrower, almost linear, except at their base, where they are pinnatifid (cleft nearly to the midrib) or auricled (eared) above and below. The texture of both kinds of fronds is somewhat leathery, and the short, oblong sori (spore masses) are disposed in one or two rows, with a considerable space between the inner one and the midrib. The whole plant is of a bushy habit, the fronds being produced from a close, compact crown. — *Hooker*, *Species Filicum*, iii., p. 74. *Nicholson*, *Dictionary of Gardening*, i., p. 486. *Lowe*, *Ferns British and Exotic*, iv., t. 31B.

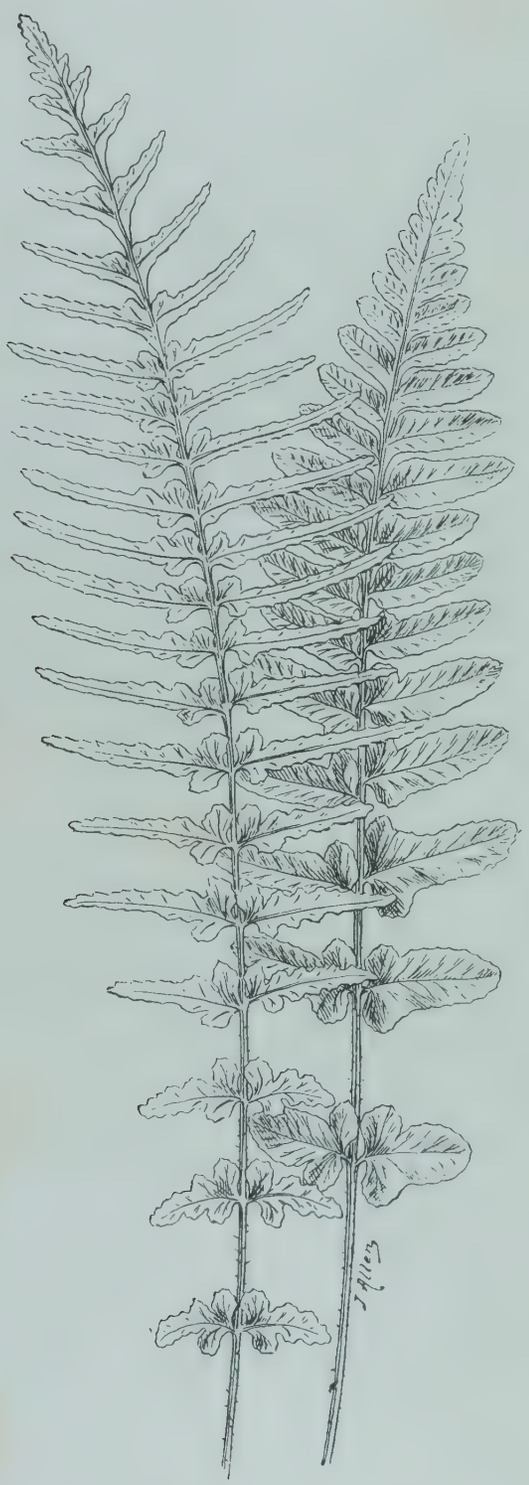


Fig. 44. Fertile and Barren Fronds of Doodia media
(⅛ nat. size).

There are several varieties known in commerce, the most distinct of which are the following:

D. m. Brackenridgei — Brack-en-ridg′-ĕ-i (Brackenridge's), *Carruthers.*

This form is a native of Viti. It is furnished with fronds of firm texture and bluntish leaflets fewer and more distant than in *D. media;* the sori (spore masses) are dense and irregularly disposed in two rows.—*Hooker*, *Synopsis Filicum*, p. 482.

D. m. connexa—con-nex′-a (connected), *Kunze.*

In this variety the fronds are larger than in the typical species and their leaflets, sometimes 3in. or more in length, are of a much softer and more papery texture.—*Hooker*, *Species Filicum*, iii., p. 75.

D. m. duriuscula—du-rĭ-us′-cul-a (rather hard), *Moore.*

A singular form, native of New Caledonia, with fronds of a firm texture and caudate (terminating in a tail-like process). The central leaflets are about ½in. long, oblong, and bluntish, and the sori (spore masses) are disposed in one row.—*Hooker*, *Synopsis Filicum*, p. 482. *Nicholson*, *Dictionary of Gardening*, i., p. 486.

D. m. Kunthiana—Kunth-ĭ-a′-na (Kunth's), *Gaudichaud.*

A form, native of the Sandwich Islands, with fronds of moderately firm texture, their central leaflets being closely set, 1in. to 1¼in. long, bluntish, and sharply toothed. The sori (spore masses) are uniformly disposed in one row.—*Hooker*, *Synopsis Filicum*, p. 482. *Nicholson*, *Dictionary of Gardening*, i., p. 486.

D. m. Milnei—Mil′-nĕ-i (Milne's), *Carruthers.*

This variety, native of the Kermadec Islands, is distinct from all others through the black colour of the stalks on which its firm fronds, of parchment-like texture and dark green colour, are borne ; also through the great size of their leaflets, the central ones being frequently 4in. to 5in. long, sharply toothed, and closely set. The sori (spore masses) in this variety are disposed in two rows.—*Hooker*, *Synopsis Filicum*, p. 482.

D. m. Moorei—Moor′-ĕ-i (Ch. Moore's), *Baker.*

A form with flexible or pendulous fronds, native of New South Wales, distinct through its black stalks ; its central leaflets, about 3in. long, are very acuminate (ending in a long, tapering point) and sharply toothed, with sori (spore masses) always disposed in one row.—*Hooker*, *Synopsis Filicum*, p. 482.

DORYOPTERIS—Dor-ў-op′-ter-is. *See* **Pteris.**

CHAPTER XIX.

DRYMOGLOSSUM, *Presl.*

(Dry-mog-lōs′-sum.)

Wood Tongue Fern.

THE name *Drymoglossum* is applied to a small genus of dwarf, stove Ferns, of creeping habit and peculiar through the dimorphous (two-formed) nature of the fronds of all the known species. It is derived from *drymos*, a wood, and *glōssum*, a tongue, in allusion to the natural place of growth and to the form of the fronds. *Drymoglossum* is a small division of the tribe *Grammitideæ*, and in Hooker and Baker's "Synopsis Filicum" it forms Genus 58. The sori (spore masses) are linear (long and very narrow) and disposed in a central or sub-marginal line, which is sometimes interrupted.

Culture.

Drymoglossums are of easy culture in a mixture of two parts of leaf mould, one of sphagnum, and one of peat, with a dash of silver sand; and we have it on the authority of Messrs. Birkenhead, of Sale, near Manchester, who are most successful cultivators, that some species have been by them grown luxuriantly on cork for several years. The slender rhizomes (prostrate stems) firmly adhere to that material, especially when it is so situated as to remain permanently moist. The plants are particularly fond of strong light, but are adverse to moisture on their fronds. Propagation is usually effected by the division of the rhizomes.

Principal Species and Varieties.

D. carnosum—car-no′-sum (fleshy), *Hooker.*

A stove species, native of the Eastern Himalayas, also of Nepaul and Kekeat Island, Japan. Its fronds are produced from a wide-creeping, thread-like rhizome (prostrate stem), which is furnished with fine roots of a fibrillose (hair-like) nature. The barren ones are either elliptical or nearly round, 1in. to 2in. long, and 1in. broad; the fertile ones are linear-spathulate (narrowly spoon-shaped), 2in. to 3in. long and ⅛in. broad; both kinds are narrowed at the base to a short stalk, and are of a leathery texture. The sori (spore masses) are disposed in a line situated midway between the edge and the midrib, and when young are covered with small scales. Fig. 45 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker*, *Species Filicum*, v., p. 189. *Nicholson*, *Dictionary of Gardening*, i., p. 495.

Fig. 45. Drymoglossum carnosum (½ nat. size).

There are two varieties of this species:

D. c. minor — min′-or (smaller), *Hooker.*

This variety, which only differs from the species through its smaller dimensions, is found in Japan, North China, Fort Hamilton, and Formosa.

D. c. subcordatum—sub-cor-da′-tum (somewhat heart-shaped), *Fée.*

In this variety, also native of China and Japan, the barren fronds, smaller than those of the species, are roundish, nearly stalkless, and of a thinner texture. The sori (spore masses) are situated near the midrib.—*Hooker*, *Synopsis Filicum*, p. 397. *Nicholson*, *Dictionary of Gardening*, i., p. 495.

D. piloselloides—pil-o-sel-lŏ-i′-dēs (Pilosella-like), *Presl.*

This is one of those species that are found in many habitats, in some cases very distant from one another. It is a native alike of the Bengal plains, Burmah, Ceylon, South India, the plains of Malabar, Java, the Philippine Islands, and Japan, in which places it covers the trunks of trees. The following is the description of it by Colonel Beddome, to whom we are also indebted for permission to reduce Fig. 46 from his "Ferns of Southern India": Rhizome long, filiform (thread-like), and of a wiry nature, covered with closely-pressed, diamond-shaped, laciniated scales, which sometimes are hair-pointed; stipes (stalks) about $\frac{1}{6}$in. long in the barren fronds, often about 1in. long in the fertile ones. These fronds are dimorphous (of two forms), the barren ones roundish or obovate (somewhat egg-shaped), $\frac{1}{2}$in. to 2in. long, $\frac{3}{4}$in. broad, very thick and fleshy, and when young more or less covered with stellate (star-like) hairs; the fertile ones 2in. to 4in. long and $\frac{1}{8}$in. to $\frac{1}{4}$in. broad. The sori (spore masses) are disposed in broad, continuous, marginal lines, often at length confluent and covering the whole under-surface; the capsules are mixed with a few stellate paraphyses (succulent, jointed filaments). This singular species, of easy culture, is particularly effective when grown on a piece of dead Tree Fern.—*Hooker, Species Filicum*, v., p. 190. *Nicholson, Dictionary of Gardening*, i., p. 495. *Beddome, Ferns of Southern India*, t. 55.

Fig. 46. Drymoglossum piloselloides ($\frac{1}{2}$ nat. size).

LOMARIA DISCOLOR BIPINNATIFIDA

D. rigidum—rig′-id-um (rigid, stiff), *Hooker.*

A singular, stove species, native of Borneo, having fronds produced from a firm, wide-creeping rhizome (prostrate stem). The barren ones, 1in. to 1½in. long and half as broad, somewhat egg-shaped, and with thickened edges, are borne on firm, upright stalks about 1in. long; the fertile ones, 4in. to 5in. long and ⅛in. broad, are narrowed into a stalk about as long as itself. Both fronds are of a very thick and rigid texture, and the sori (spore masses) are disposed in a deep groove between the broad midrib and edge.—*Hooker, Species Filicum*, v., p. 190. *Nicholson, Dictionary of Gardening*, i., p. 495.

DRYNARIA—Dryn-a′-rĭ-a. *See* **Polypodium.**

EGENOLFIA—Eg-en-olf′-ĭ-a. *See* **Acrostichum.**

ELAPHOGLOSSUM—El-aph-og-lōs′-sum. *See* **Acrostichum.**

EUPODIUM—Eu-pod′-ĭ-um. *See* **Marattia.**

CHAPTER XX.

FADYENIA, *Hooker.*

(Fad-yen′-ĭ-a.)

IN Hooker and Baker's "Synopsis Filicum" *Fadyenia* forms Genus 47; it is dedicated to the memory of Dr. James McFadyen, author of "A Flora of Jamaica," and is composed of a solitary species, the distinguishing characters of which reside in its oblong sori (spore masses), disposed in two series near the midrib and terminating the free veinlets, being covered by a large sub-reniform involucre (somewhat kidney-shaped covering) attached by the centre, but free all round the edge.

Culture.

This eccentric-looking little Fern is so thoroughly distinct from any other known species that no mistake as regards its classification can possibly be made by anyone who has seen it once. It is usually considered difficult to manage, yet it is free growing when kept under suitable conditions; these consist of heat, moisture, and permanent shade. It succeeds well in a compost of three parts fibrous peat and one part sand, with abundant moisture at the roots. Under such treatment it not only flourishes, but rapidly spreads in all directions, through the rooting of the proliferous extremities of its barren fronds where the young plants thus produced (and without being disconnected from the parent plant) in turn yield subjects having all the characters of a fully-developed specimen.

F. prolifera—pro-lif′-er-a (proliferous), *Hooker.*

A very curious, stove species, native of Jamaica and the Island of Cuba, with barren and fertile fronds totally different (see Coloured Plate), but both entire (undivided), of a dull green colour, and of a somewhat leathery texture. The barren ones, about 5in. long and ¾in. to 1in. broad, are prostrate or horizontal, oblong-egg-shaped and terminating in a tail-like process when they are proliferous at their extremity. The fertile ones, 6in. to 9in. long and ¼in. to ½in. broad, are ligulate (strap-shaped), narrowed towards the base, but with their extremity broad and rounded. These are produced from the centre of the plant, and are upright; they are much contracted, and their large, oblong sori (spore masses), overlapping towards the summit of the frond, are disposed in two series, and occupy nearly the whole space between the midrib and the edge. The large and somewhat kidney-shaped involucre by which they are covered is of a slightly hairy nature, and finely toothed on the margins.—*Hooker, Species Filicum*, iv., p. 160. *Nicholson, Dictionary of Gardening*, ii., p. 1. *Lowe, Ferns British and Exotic*, vi., t. 2.

FEEA—Fe′-ĕ-a. *See* **Trichomanes.**

CHAPTER XXI.

GLEICHENIA, *Smith.*

(Glei-che′-nĭ-a.)

Umbrella and Bead Ferns.

THIS genus, dedicated to the memory of W. F. Gleichen, a German botanist who lived towards the end of the eighteenth century, contains about thirty species of ornamental, stove and greenhouse Ferns, all of which are provided with running or creeping rhizomes (prostrate stems), from which the fronds are produced at longer or shorter intervals according to the species. In Hooker and Baker's "Synopsis Filicum," *Gleichenia* forms Genus 2, and, with the exception of *Platyzoma*, comprises all the Ferns contained in the sub-order *Gleicheniaceæ* of Brown. The plants are easily distinguished from all other Ferns by their peculiar mode of growth (already described at p. 63, Vol. I.). Their pinnæ (leaflets) are deeply pinnatifid (cut very nearly to the midrib), and furnished with small segments, either of a peculiarly concave nature and suborbicular (nearly round in shape), or pectinate (in form of a comb), with elongated lobes.

Gleichenia is divided into two very distinct sections, as follow:

Eugleichenia (Eu-glei-che′-nĭ-a) (true Gleichenias), *Brown*. In these the sessile sori (stalkless spore masses), composed of few capsules, usually two to four, are disposed singly at the extremity of a veinlet on the superior base of a lobe of the leaflets, which in this case are uniformly small and roundish.

Mertensia (Mer-ten′-sĭ-a), *Presl*. Although the distinguishing character, which resides in the mode of fructification, is, in the plants belonging to this

section, similar to that noted in *Eugleichenia*, the Mertensias are, even to the superficial observer, totally distinct. Their stipe (stalk) is forked, branched, and copiously bipinnate (twice divided to the midrib) or, from the development of an axillary bud, proliferous and pinnate; the very long leaflets are again pinnate, and frequently their pinnules (leafits) are deeply pinnatifid. The spore masses, stalkless as in the plants of the foregoing section, and disposed three or four together, are situated near the middle, or at the forking, of the veinlets, the ultimate leaflets being comb-like and furnished with linear (long and narrow) or oblong segments much longer than in the plants of the preceding section.

Although the genus *Gleichenia* has no British representatives, it shows a very extensive geographical distribution. Some of its members are native of New Zealand, New South Wales, and Tasmania; others are of West Indian and South American origin; while China and Japan, and even South Africa, produce a few distinct species.

Culture.

The principal requirements of these singular and beautiful Ferns have already been given at pp. 64 and 65 of Vol. I.; but it is as well, perhaps, to repeat here that in the majority of cases cool treatment is the most suitable for them, and that with very few exceptions they fare best in a house where during the winter the temperature falls as low as 45deg. In fact, most, if not all, of the failures experienced in the early attempts at cultivating these charming plants may be traced to the pernicious practice of growing them in too much heat—treatment which caused them to make stunted growths, generally full of thrips and scale. Besides the house being at most what is usually called intermediate, it should also be light and well ventilated. Bright light is indispensable in the culture of Gleichenias; they will even withstand a little sunshine during the morning and the afternoon, and be benefited by it. Light, in fact, is of such importance that if a plant in perfect health be placed under, say, Tree Ferns, or under any other plant that will permanently shade it, it will soon start on a retrograde march, and show by its spindly growth that it does not at all appreciate the presence of neighbours taller than itself. It is also worthy of note that success

cannot reasonably be expected unless these plants are in a perfect state of cleanliness.

The plants comprised in the section *Eugleichenia*, most of which have orbicular segments or pinnules resembling a quantity of beads, are provided with rhizomes of a particularly slender and naturally hard nature. They are very shallow rooters, and when not planted out should be grown in rough, sandy peat, in pans. Their rootlets being short and exceedingly brittle, it is necessary that the rhizomes from which they are produced should receive special attention at the hands of the cultivator ; and as these have a particular objection to being buried underground, they must be carefully kept on the surface by being pegged on the potting material, which must be made firm, if not altogether hard. It is therefore indispensable that the plants should have abundance of pot-room, so as to give the rhizomes every facility for spreading. The pans should be well drained, as, although Gleichenias require liberal waterings, nothing is more injurious to them than stagnant moisture at the roots.

Not only do the plants belonging to the *Mertensia* section differ from the others by their general appearance, but they are provided with rhizomes of a totally different nature, being fleshy, brittle, much stouter, and usually plunging deeply into the ground of their own accord. For these, a mixture of two parts fibrous peat, one part fibrous loam, and one of sand is preferable to the sandy peat recommended for the others. They also require a quantity of water at the roots, though stagnant moisture must carefully be avoided. Plants of both sections are all the better for being at all times kept dry overhead.

One of the principal causes of the scarcity of Gleichenias in general collections is attributable to their slow propagation, as, with the exception of seedlings of *G. circinata speluncæ* and *G. c. semi-vestita* of commerce, and of *G. rupestris*, which have of late years and at various times been raised at Messrs. J. Veitch's establishment, the mode of increase has always been limited to the division of clumps, an operation which is very tedious, extremely hazardous, and seldom attended with complete success. We have never heard of seedlings of plants belonging to the *Mertensia* section having been raised in this country, and that, together with the fact that the importations direct from their various habitats seldom give entire satisfaction, is

probably the reason why they are so rare. Moreover, the difficulties, real or imaginary, to be encountered in the cultivation of Gleichenias have tended to keep them out of many collections; but thanks to successful growers of these plants having made public the knowledge of their requirements and endeavoured to simplify their culture, we are rapidly gaining ground.

Principal Species and Varieties.

G. acutifolia—ac-u′-tif-ol′-ĭ-a (acute-leaved). A synonym of *G. quadripartita.*

G. alpina—al-pi′-na (mountain-loving). A variety of *G. dicarpa.*

G. Bancroftii—Ban-crof′-tĭ-i (Bancroft's). Synonymous with *G. longissima.*

G. (Mertensia) Bibreæ—Mer-ten′-sĭ-a; Bib-re′-æ (Madame De Bibra's), *Mettenius.*

This elegant, greenhouse species, native of Valdivia, Chili, is of medium size only, with fronds twice as broad as they are long, three times dichotomously divided (repeatedly forked), and clothed with minute blackish scales. They are of a rigid texture; their leaflets, about 6in. long and 1¾in. broad, are deeply cut into close, linear (long and narrow), sharp segments with recurved edges; both surfaces are of a light green colour, the upper one smooth, the lower one slightly scaly on the ribs. The sori (spore masses) are almost hidden by the revolute borders.—*Hooker, Synopsis Filicum*, p. 449.

G. bifurcata—bif-ur-ca′-ta (twice forked). A synonym of *G. flagellaris.*

G. (Eugleichenia) Boryi—Eu-glei-che′-nĭ-a; Bo′-rў-i (Bory's), *Kunze.*

A stove species, of small dimensions, native of the Bourbon Islands. Its singular and pretty little fronds, seldom more than 4in. long and 3in. broad, are composed of four nearly opposite leaflets, the ultimate pair constituting a fork. Their terminal pinnules (leafits) lengthen into a tail, and their lobes are very small, nearly round, concave, and glaucous (bluish-green) underneath. The sori (spore masses) consist of a few capsules mixed with copious wool of a ferruginous (rusty) colour.—*Hooker, Synopsis Filicum*, p. 12.

G. bracteata—brac-tĕ-a′-ta (bracteate, furnished with leaflets more or less modified in form). Synonymous with *G. flagellaris.*

G. (Eugleichenia) circinata—Eu-glei-che′-nĭ-a ; cir-cin-a′-ta (circinate or rolled inwards), *Swartz.*

This is an elegant, greenhouse species (Fig. 47), native of Australia, Tasmania, New Zealand, New Caledonia, and Malacca. It is of particularly slender habit, with short and narrow fronds borne on stems clothed with chaffy hairs of a reddish-brown colour. The lobes of their leaflets are ovate or nearly round, especially when fertile, more or less glaucous underneath, and have their margins slightly rolled inwards. The sori (spore masses) are disposed in capsules three or four together, and very abundantly produced. This species is also known as *G. microphylla.*—*Hooker*, *Species Filicum*, i., p. 3, t. 2. *Nicholson*, *Dictionary of Gardening*, ii., p. 72. *Beddome*, *Ferns of British India*, t. 177.

Fig. 47. Gleichenia circinata (⅛ nat. size).

Fig. 48. Gleichenia circinata Mendelli (greatly reduced).

Several very handsome forms, considered in commerce as distinct species, are only varieties of *G. circinata.* The following are the most ornamental of those known in cultivation :

G. c. glauca — glau′-ca (bluish-green). Identical with *G. c. Mendelli.*

G. c. Mendelli — Men-del′-li (Mendell's), *Moore.* One of the most distinct and free-growing kinds in cultivation, differing from the foregoing species in being much more robust in growth and of a

thicker texture ; in fact, it is a very compact-habited plant (Fig. 48). The under-part of its lobes, which, instead of being circinate (rolled inwards), are perfectly flat, is of a beautiful silvery colour. This variety is also known in gardens under the name of *G. c. glauca.*

G. c. semi-vestita—se-miv-es-ti′-ta (half-clothed), *Labillardiere.*

A handsome, stove variety, native of New Caledonia and Malacca, differing from the species, and also from its other forms, by its close habit and very erect mode of growth. It is further distinct on account of the intensely deep green colour and shining nature of the upper side of its leaflets, the segments of which are perfectly flat, and also by the total absence of any glaucous tint on their under-surface. The stems and stalks of the segments are densely covered with short hairs of a ferruginous (rusty) colour. Fig. 49 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Lowe, Ferns British and Exotic*, viii., t. 54.

Fig. 49. Frond of Gleichenia circinata semi-vestita (⅓ nat. size).

G. c. speluncæ—spe-lun′-cæ (cavern-loving), *Brown.*

Perhaps this rare, large-growing and essentially distinct variety is the most handsome and decorative of the whole group of plants with beaded fronds. It is a native of New South Wales and Tasmania, and is easily recognised by its pendent but not curving fronds, which are produced in abundance and divided into elegantly-arching or pendulous leaflets, loosely and gracefully set. These fronds vary considerably, not only in size, but also in the degree of ramification ; and their loosely-set segments are very distinctly

curved inwards, forming little cavities, as if meant to hold and protect the spores; this character is very noticeable even in barren fronds. The under-surface is so glaucous as to appear almost silvery, and the whole plant is of a charming pale green colour, having an aspect quite different from any of the others of its section.—*Lowe, Ferns British and Exotic*, viii., t. 49.

G. (Mertensia) cryptocarpa — Mer-ten′-sĭ-a; cryp-toc-ar′-pa (having hidden fruit), *Hooker.*

A greenhouse species of medium dimensions, native of South Chili, Chiloe, and the Falkland Islands. Its fronds, of a very smooth nature and leathery texture, are dichotomously flabelliform (repeatedly forked and fan-shaped). Their broadly-spear-shaped, upright and compact leaflets are 4in. to 5in. long and 1in. broad, and their segments, narrow-linear and strongly veined, present a peculiar appearance through their margins being singularly revolute or bent inwards, and concealing the sori (spore masses), which are composed of capsules disposed one to four in a group. The fronds, when dry, are of a most peculiar deep yellow or yellow-brown colour.—*Hooker, Species Filicum*, i., p. 7, t. 6A. *Nicholson, Dictionary of Gardening*, ii., p. 72.

G. (Mertensia) Cunninghami—Mer-ten′-sĭ-a; Cun′-ning-ham-i (Cunningham's), *Heward.*

This very pretty, greenhouse species, native of New Zealand, where it is known by the common appellation of the "Umbrella Fern," is unfortunately very rarely seen in our gardens at present. Although it has been imported by different firms at various times, it does not appear to have ever become very popular, for the simple reason that in nearly every instance all, or almost all, the imported clumps died soon after their arrival in this country; yet it is a species worthy of the attention of every cultivator. It is erect in habit, its fronds, of a coriaceous (leathery) texture, being produced from thick, underground creeping rhizomes (stems); they grow to 3ft. high, and are dichotomously flabelliform (repeatedly forked and fan-shaped). The leaflets, narrow-spear-shaped and pointed, are often falcate (sickle-shaped), 4in. to 6in. long and ½in. broad; their narrow and sharp-pointed segments are very glaucous, even bluish, underneath, and hairy. The sori (spore masses) are composed of capsules disposed two to four in a group. The appearance of the

young growths is very peculiar, as until they are perfectly developed they are completely clothed with large, brown, chaffy scales.—*Hooker*, *Species Filicum*, i., p. 6, t. 6B. *Nicholson*, *Dictionary of Gardening*, ii., p. 72.

G. (Eugleichenia) dicarpa—Eu-glei-che′-nĭ-a ; dic-ar′-pa (two-fruited), *Brown.*

An elegant and equally variable greenhouse species, native of Australia and Tasmania, where it is very abundant, and also of the Isle of Pines and of New Caledonia. It is distinguishable from all the other species belonging to the same section by its graceful fronds, of variable length, being repeatedly divided in two only, the leaflets being again pinnatifid (cleft nearly to the midrib), and by their lobes or segments being small, round, deeply pouched, pale green below, and of a dark shining green above. The sori (spore masses) consist of two capsules, concealed in the almost slipper-shaped lobes, and are mixed with rusty-coloured hairs which often extend to the stalks.—*Hooker*, *Species Filicum*, i., p. 3, t. 1C. *Nicholson*, *Dictionary of Gardening*, ii., p. 72. *Lowe*, *Ferns British and Exotic*, viii., t. 48.

In commerce there are several very handsome forms of this variable species, the most distinct of which, usually accepted as species, are as follow :

G. d. alpina—al-pi′-na (mountain-loving), *Brown.*

A pretty, dwarf variety, from Tasmania and New Zealand, where it is found on high mountains. It differs from the species in being smaller in all its parts and of a more compact habit, and also in having the stalks of its fronds and the young shoots thickly clothed with short wool of a chaffy nature and of a rusty-brown colour.—*Hooker*, *Species Filicum*, i., p. 2. *Nicholson*, *Dictionary of Gardening*, ii., p. 72.

G. d. hecistophylla—he-cis′-toph-yl′-la (smallest-leaved), *Allan Cunningham.*

This most graceful and slender form, native of New Zealand, is of erect habit and rapid growth. Its fronds, abundantly produced from wiry, fast-creeping rhizomes (stems), are borne on dark-coloured stalks of a smooth, shining nature. They are dichotomously divaricated (growing in duplicate, the one branch receding from the other, and each again producing

a similar growth of twin branches, and each branch once divided), their branches being from 10in. to 14in. long and pectinate (comb-shaped). The rather distant leaflets, which number about fifty pairs, are opposite, or nearly so, in the lower part of the branches, alternate in their upper part, with small, nearly round segments, so that their outline resembles that of a string of small beads of equal size, and not larger than small pin-heads, closely strung together. The sori (spore masses) consist of two capsules, or spore cases, sunk in the hollow of the pouched segments.—*Hooker*, *Species Filicum*, i., p. 4, t. 2B. *Lowe*, *Ferns British and Exotic*, viii., t. 52.

G. d. longipinnata—long-ip-in-na′-ta (having long pinnæ or leaflets), *Moore.*

A remarkably handsome, greenhouse form, which must not be confounded with *G. longipinnata* of Hooker (a variety of *G. pubescens*); it is a native of Tasmania, whence it is occasionally imported among plants of the typical species. The fronds, which are longer than those of the type, and of an exceedingly graceful habit, have their pendulous leaflets formed of numerous small and very deeply-pouched segments, the pouching being caused by the recurving of their edges. The younger fronds are of a light pea-green colour, whereas the fully-expanded and matured ones are shaded with a sort of metallic-bluish tint, which they retain for a long time; their under-side is slightly glaucous (bluish-green), and their stalks are shining black. This variety is a remarkably good grower, forming an elegant specimen in a much shorter space of time than most other kinds.—*Nicholson*, *Dictionary of Gardening*, ii., p. 72.

G. (Mertensia) dichotoma—Mer-ten′-sĭ-a; dich-ot′-om-a (divided in two), *Willdenow.*

This handsome, distinct, stove species is one of the most widely distributed of the whole group, for it is found in tropical and sub-tropical regions in the New and in the Old World, in the Pacific Islands, and as far north as Japan. In his excellent work on "Ferns of Southern India," Beddome states that it is a very common Fern, from the sea-level on the western coast to the top of the highest mountain-ravines on the North Arcot Hills. On account of this extensive distribution, it is very variable in size as well

as in the shape of its leaflets, which are sometimes 1½ft. long and 6in. broad, but frequently only 5in. long and 2in. broad. In some cases they are more or less tomentose (woolly) beneath, but they are generally smooth, bright green above, and very glaucous underneath. Occasionally also the lowest pair of the lobes of which they are composed are much elongated, reflected, and pinnatifid (cleft nearly to the midrib), and the species is distinguished at first sight by the pairs of accessory leaflets which are invariably present at the base of the forks (Fig. 50, reduced from Col. Beddome's "Ferns of Southern India," by the kind permission of the author). *G. dichotoma* is a solitary species in its section not only on account of the peculiar formation of its fronds, but also because it is perhaps the only species provided with wiry, creeping rhizomes of the smooth, shining nature of those of the plants with beaded leaflets. The sori (spore masses), according to Lowe, consist of from ten to twelve capsules, punctiform (in the form of a small pointed projection) and naked. *G. Hermanni*, and *G. rufinervis* are synonymous with this species.—*Hooker*, *Species Filicum*, i., p. 12. *Nicholson*, *Dictionary of Gardening*, ii., p. 72. *Lowe*, *Ferns British and Exotic*, viii., t. 51. *Beddome*, *Ferns of Southern India*, t. 74.

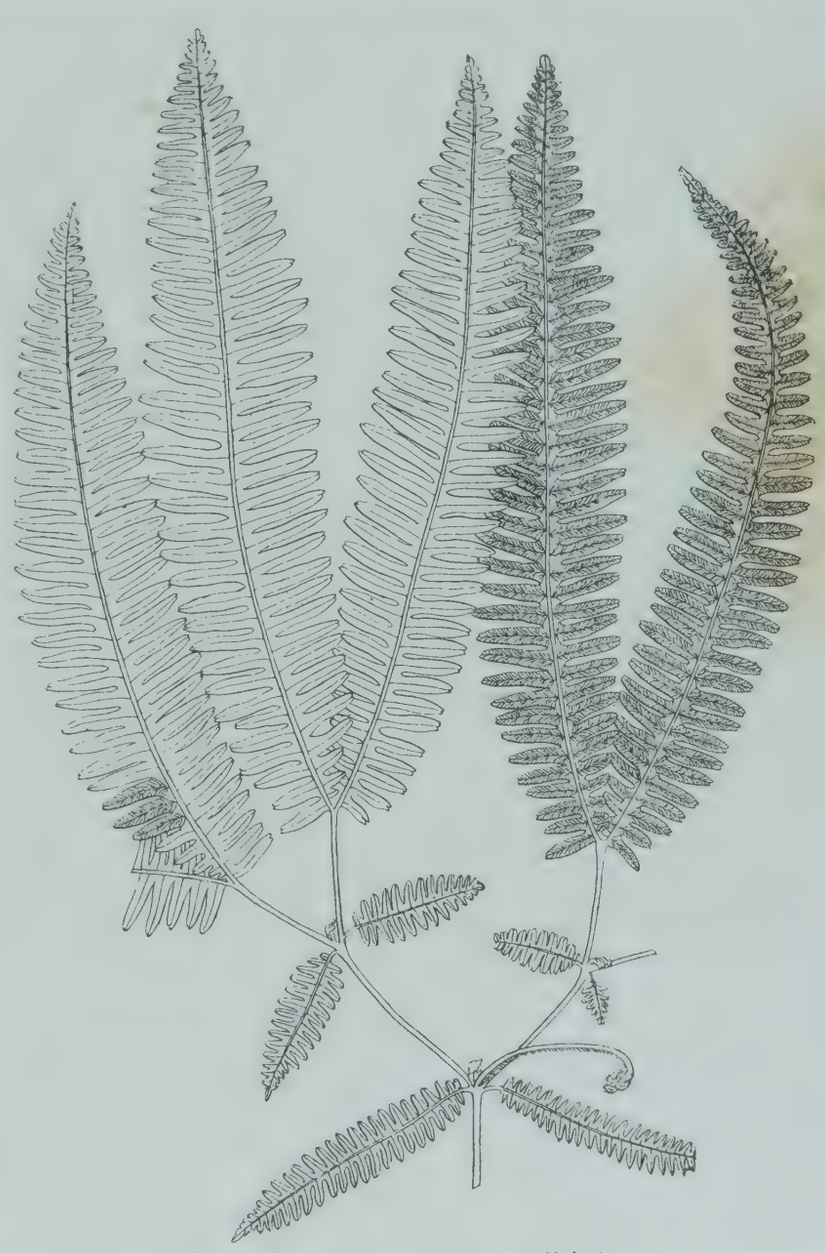


Fig. 50. Frond of Gleichenia dichotoma (¼ nat. size).

G. excelsa—ex-cel′-sa (tall). Synonymous with *G. longissima*.

G. (Mertensia) flabellata — Mer-ten′-sĭ-a ; fla-bel-la′-ta (fan-shaped), *Brown.*

This essentially greenhouse species, no doubt the most popular and best-appreciated of all those belonging to its section, is a native of Australia and Tasmania, also of New Zealand and New Caledonia. It is a Fern of robust, erect habit, making a magnificent specimen. The handsome, fan-shaped fronds, produced from thick, underground rhizomes (prostrate stems) of a woody nature, are very proliferous and two or three times forked, thus producing a whorl of spear-shaped, ascending leaflets furnished with comb-like pinnules (leafits) and terminating in a tail-like process. These pinnules or segments are very narrow and of a bright green colour on both surfaces. The sori (spore masses) consist of from one to four naked spore cases disposed on each side of the midvein. The stalks are stout, of a dark colour, and it is not unusual to see specimens 6ft. in height and 6ft. through. — *Hooker*, *Species Filicum*, i., p. 6. *Nicholson*, *Dictionary of Gardening*, ii., p. 73. *Lowe*, *Ferns British and Exotic*, viii., t. 50.

G. (Mertensia) flagellaris — Mer-ten′-sĭ-a ; flag-el-la′-ris (whip-like), *Sprengel.*

A stove species, native of the Mauritius, Bourbon, Madagascar, and Fiji Islands, and abundant in Java and the Malayan Islands. It is a very distinct Fern, with smooth fronds repeatedly dichotomous (divided in two), copiously foliaceous (very leafy), often glaucous (bluish-green) underneath, and of a somewhat leathery texture. The pinnæ (leaflets) are extremely variable, being sometimes nearly erect and at other times divaricate (spreading irregularly in various directions) ; sometimes broad or narrowly spear-shaped, 5in. to 1ft. and more long. Their segments, ½in. to 2in. or more in length and linear (very narrow), are sometimes ferrugineo-tomentose (covered with rusty-coloured wool) at the base beneath. The sori (spore masses) are disposed two to four on each side of the midvein. *G. bracteata*, *G. bifurcata*, *G. lævigata*, and *G. plumæformis* are other names for this species.—*Hooker*, *Species Filicum*, i., p. 10. *Nicholson*, *Dictionary of Gardening*, ii., p. 73.

G. furcata—fur-ca′-ta (forked). Synonymous with *G. pubescens.*

G. gigantea—gig-ant-e′-a (gigantic). A synonym for *G. longissima.*

G. glauca—glau′-ca (bluish-green). Synonymous with *G. longissima.*

G. hecistophylla—he-cis′-toph-yl′-la (smallest-leaved). This is a variety of *G. dicarpa.*

G. Hermanni—Her-man′-ni (Hermann's). A synonym of *G. dichotoma.*

G. (Mertensia) hirta—Mer-ten′-sĭ-a ; hir′-ta (hairy), *Blume.*

A curious and very handsome, stove species, native of the Malayan Islands. Its massive fronds, which are many times dichotomous (divided into two), are formed of ascending, flabellate (fan-shaped) branches furnished with leaflets 7in. to 9in. long, standing at an angle of 30deg., very narrow, gradually tapering, and cut nearly to the midrib into oblong-linear, blunt, slightly-curved lobes with revolute margins ; their colour is dark green above, very glaucous (bluish-green) below, the midvein being densely clothed with spear-shaped scales of a rusty-brown colour, paler at the margin, and ciliated or furnished with a hairy fringe. The sori (spore masses), composed of three to five naked capsules, are disposed between the midvein and the margin.—*Hooker, Species Filicum*, i., p. 11.

G. lævigata—læ-vig-a′-ta (smooth). Synonymous with *G. flagellaris.*

G. longipinnata—long-ip-in-na′-ta (having long pinnæ or leaflets). This name is applied to varieties of *G. dicarpa* and *G. pubescens.*

G. (Mertensia) longissima — Mer-ten′-sĭ-a ; long-is′-sim-a (longest), *Blume.*

This remarkably robust-growing, greenhouse species, is also known as *G. Bancroftii, G. excelsa, G. gigantea, G. glauca*, and *G. pinnata ;* it is usually given as a native of China and Japan, in which countries it is common. Beddome, however, states that it is equally found in Assam, Nepaul, Bhotan, Sikkim, Java, and Khasya ; while, according to Hooker, the same plant with trifling modifications is distributed all over the Malayan Islands and Peninsula, the Sandwich Islands, the West Indies. New Granada, Mexico, and Guatemala. We have it also on the authority of Ch. Curtis, Superintendent of the Government Experimental Nurseries in Penang, that it occurs plentifully in that Island, where its fronds attain extraordinary dimensions, but that it is seldom, if ever, found there below 2000ft. elevation, and that it is only above that

altitude that the plant is found in its best condition. The massive, handsome fronds, of larger dimensions than those of any other Gleichenia, being often several feet long, and borne on very stout stalks of a shining brown colour, are produced from thick, underground rhizomes (prostrate stems), and simply forked; they have a totally distinct aspect, and appear as if intermediate between those of *Eugleichenia* and those of *Mertensia*, for they are neither of the beaded nature peculiar to plants belonging to the former, nor have they their segments linear (long and narrow) like those of the latter. The pinnæ (leaflets) with which each branch is furnished are closely set, 4in. to 8in. long, 1in. to 2in. broad, alternate (not opposite), and deeply pinnatifid (divided nearly to the midrib). The linear or oblong pinnules or segments are slightly toothed, perfectly flat, and of a beautiful glaucous (bluish-green) colour on their under-side; in specimens found growing at a high elevation their midveins are usually densely covered with short scales of a soft, woolly nature and of a ferruginous (rusty-brown) colour. The young growths are completely covered with large, dark (almost black), chaffy scales, which hold on until the perfect development of the fronds. The bifurcations are very thickly set at their base with pinnules closely set, and forming a sort of frilling round the stalk. The whole of the plant is of a delightful light green colour. The sori (spore masses) consist of capsules disposed in small groups of from three to five, situated on each side of the midvein and frequently mixed with hairs.—*Hooker*, *Species Filicum*, i., p. 4. *Nicholson*, *Dictionary of Gardening*, ii., p. 73. *Beddome*, *Ferns of British India*, t. 30.

G. Mathewsii—Math-ews′-ĭ-i (Mathews's). Synonymous with *G. pubescens.*

G. Mendelli—Men-del′-li (Mendell's). A variety of *G. circinata.*

G. microphylla—mi-croph-yl′-la (small-leaved). A synonym of *G. circinata.*

G. (Mertensia) Milnei—Mer-ten′-sĭ-a; Mil′-nĕ-i (Milne's), *Baker.*

A very handsome, stove species, native of Aneiteum, and in general appearance intermediate between *G. dichotoma* and *G. flagellaris.* Its ample fronds, composed of many twice-forked, horizontal side-branches, are leafy down to the main rachis (stalk of the leafy portion); their terminal leaflets, oblong and narrowed to both ends, are 5in. to 6in. long, and formed of from thirty to forty pairs of ligulate (strap-shaped), blunt segments only about $\frac{1}{12}$in.

broad. The base of the forks, as in *G. dichotoma*, is usually furnished with small accessory leaflets; both surfaces of the fronds are green, and their stalks are slightly downy. The sori (spore masses) are disposed in the middle of the segments, in little groups of from one to three together.—*Hooker*, *Synopsis Filicum*, p. 449.

G. (Eugleichenia) moniliformis — Eu-glei-che′-nĭ-a; mon-i-lif-or′-mis (beaded), *Moore*.

This remarkable, stove species, native of New Caledonia, is easily distinguished through its slender, erect-growing, branched stems or rhizomes producing, at the summit of tufted stalks 3in. to 4in. high, leathery and deeply-pinnatifid fronds 8in. to 12in. long and 3in. broad, the lobes of which are broad and concave beneath. The sori (spore masses) are usually disposed in single capsules near the midvein, and are frequently found mixed with hairs of a ferruginous (rusty-brown) colour.—*Hooker*, *Synopsis Filicum*, p. 11.

G. (Mertensia) Norrisii—Mer-ten′-sĭ-a; Nor-ris′-ĭ-i (Sir W. Norris's), *Mettenius*.

A stove species, native of the Malayan Peninsula, with fronds simply forked and furnished with lanceolate pinnæ (spear-shaped leaflets). The lower pinnæ are distinctly stalked, spreading, 6in. to 9in. long, and cut down to a narrow wing into close, entire, ligulate (strap-shaped), blunt segments of a rigidly leathery texture, bluish-green underneath, and smooth on both surfaces. The sori (spore masses), disposed near the midvein, are from twelve to twenty to a segment.—*Hooker*, *Synopsis Filicum*, p. 449.

G. (Mertensia) pectinata — Mer-ten′-sĭ-a; pec-tin-a′-ta (comb-like), *Presl*.

This distinct, stove species is common in all parts of South America. Its stalks, produced from slender, creeping rhizomes, are branched and zigzag; the branches bear from one to three pairs of forked leaflets of a divaricate (straggling) nature, and their segments, which are never decurrent, are sometimes smooth, sometimes slightly downy, and frequently glaucous (bluish-green) underneath. The sori (spore masses) consist of from eight to ten capsules, disposed on each side of the midvein of the segments.—*Hooker*, *Species Filicum*, i., p. 11. *Nicholson*, *Dictionary of Gardening*, ii., p. 73.

G. (Mertensia) pedalis—Mer-ten′-sĭ-a ; ped-a′-lis (a foot in length), *Kaulfuss.*

A greenhouse species, of small dimensions, native of Chili, where it is found as far south as Valdivia, and also of Juan Fernandez. Its fronds, often proliferous and borne on stoutish stalks clothed with deciduous, chaffy scales, are dichotomously flabelliform (twice forked and fan-shaped), and are furnished with narrow-spear-shaped leaflets of a somewhat leathery texture, spreading or recurved, 4in. to 6in. long, ½in. to ¾in. broad, deeply pinnatifid (divided nearly to the midrib), glaucous (bluish-green) underneath, yellowish-green above, horizontal, and with their margins scarcely recurved. The sori (spore masses) consist of from two to four capsules, disposed together close to the midvein of the segments.—*Hooker, Species Filicum*, i., p. 6, t. 8B.

G. pinnata—pin-na′-ta (pinnate). Synonymous with *G. longissima.*

G. plumæformis — plu-mæ-for′-mis (feather-formed). A synonym for *G. flagellaris.*

G. (Eugleichenia) polypodioides—Eu-glei-che′-nĭ-a ; pol-yp-od′-ĭ-ŏ-i′-dēs (Polypodium-like), *Smith.*

This pretty, greenhouse species, of particularly dwarf habit, is a native of Cape Colony, and produces from thin, wiry rhizomes (prostrate stems) small, dichotomously-branched fronds, as slender in their habit as those of *G. circinata*, but richer in texture. These fronds are borne in great abundance, and are furnished with loose, drooping leaflets, the egg-shaped lobes of which are closely set, of a bright pea-green above, and glaucous (bluish-green) beneath. This species is easily distinguished from others on account of its peculiar colour, as well as by its extremely slender habit. The flat-topped sori (spore masses) consist of three or four capsules sunk together in a cavity.—*Hooker, Species Filicum*, i., p. 3.

G. (Mertensia) pubescens — Mer-ten′-sĭ-a ; pu-bes′-cens (downy), *Humboldt, Bonpland, and Kunth.*

A very handsome, stove species, from Tropical America and the West Indian Islands, where it is abundant. It is essentially distinct from all other known kinds through the peculiar cobwebby nature of the under-side of its handsome fronds, which are abundantly produced from underground, creeping

rhizomes (stems) as robust as, and by no means unlike, those of the better-known *G. flabellata.* These fronds, borne on stalks of an equally woolly or scaly nature, are repeatedly dichotomous (several times forked) and of variable length; the pinnæ (leaflets) are from 5in. to 2ft. in length, 1in. to 2in. in breadth, pectinato-pinnatifid (comb-like), and divided nearly to the midrib

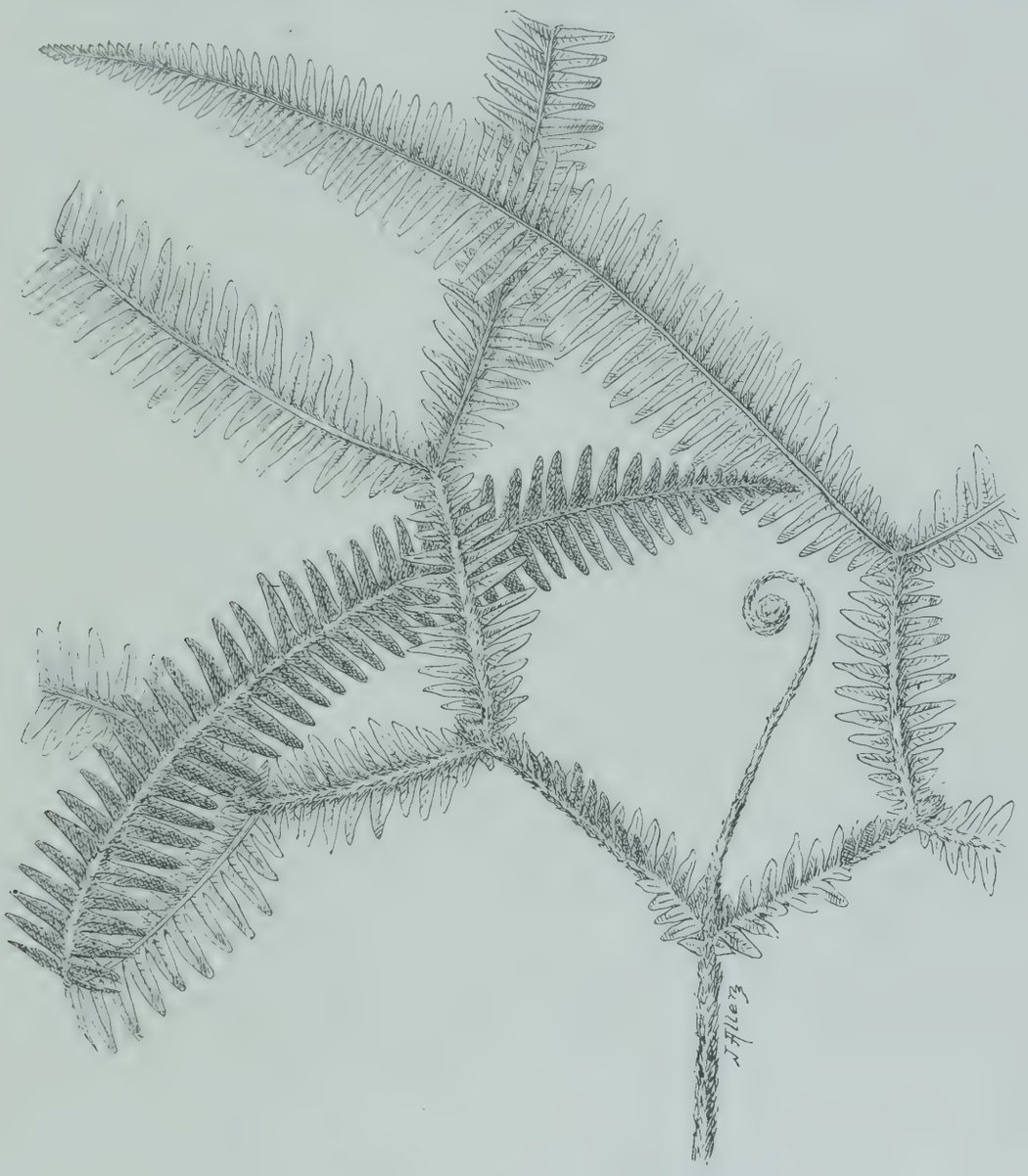


Fig. 51. Portion of Frond of Gleichenia pubescens
(greatly reduced).

(Fig. 51). They are of a dark, dull green colour above, and a little brighter underneath; their under-surface is densely covered with a woolly pubescence (down) of a ferruginous (rusty-brown) colour, which adds to the attractiveness of the plant. The sori (spore masses) are composed of capsules disposed from two to five together, often concealed among the pubescence. This species is

very variable in the more or less decurrent lobes of the frond, and in the presence or absence of tomentum and scales. It is also known as *G. furcata*, *G. Mathewsii*, and *G. tomentosa.*—*Hooker*, *Species Filicum*, i., p. 8. *Nicholson*, *Dictionary of Gardening*, ii., p. 73. *Lowe*, *New and Rare Ferns*, t. 60.

G. p. longipinnata — long-ip-in-na′-ta (having long pinnæ or leaflets), *Hooker.*

This variety only differs from the species in having its pinnæ (leaflets) 2ft. long and 3in. broad.—*Hooker*, *Species Filicum*, i., p. 9; *Synopsis Filicum*, p. 14.

G. (Mertensia) quadripartita—Mer-ten′-sĭ-a; quad-rip-ar-ti′-ta (divided in four parts), *Hooker.*

A greenhouse species, of small dimensions, native of the Straits of Magellan and Port Famine, and also known as *G. acutifolia.* Its fronds, only once forked and with each branch simply forked again, are of a leathery texture, very dark green above, and red-brown beneath; they are furnished with spear-shaped, somewhat comb-like leaflets 4in. to 6in. long, 1in. to 1½in. broad, the lobes of which are narrowly sickle-shaped, sharply pointed, and show their margins a little recurved. The sori (spore masses) are disposed from one to three together near the midvein.—*Hooker*, *Species Filicum*, i., p. 7, t. 8A. *Nicholson*, *Dictionary of Gardening*, ii., p. 73.

G. (Mertensia) revoluta — Mer-ten′-sĭ-a; rev-ol-u′-ta (turned back), *Humboldt, Bonpland, and Kunth.*

This greenhouse species, of distinct appearance, is a native of the summit of the Blue Mountains, Jamaica, and also of the Andes of Quito, where it is found at 9000ft. to 10,000ft. elevation. Its rigid fronds, borne on stalks of a scaly nature, are repeatedly forked into two, rarely proliferous, and furnished with narrow-pointed leaflets 5in. to 7in. long and about ¾in. broad, the lobes of which are egg-shaped, horizontal, blunt, with the margin recurved, and glaucous (bluish-green) beneath. The sori (spore masses) consist of capsules disposed from two to four together on each side of the midvein.—*Hooker*, *Species Filicum*, i., p. 7, t. 7A.

G. rufinervis—ru-fin-er′-vis (red-nerved). A synonym of *G. dichotoma.*

G. (Eugleichenia) rupestris—Eu-glei-che′-nĭ-a ; ru-pes′-tris (growing in rocky places), *Brown.*

An exceedingly rare and very handsome, greenhouse species, native of New South Wales and Port Jackson, somewhat allied to *G. circinata*, but of denser and more symmetrical habit ; it is distinct from most other plants of the same section through the leathery texture of its foliage and the reddish-purple tint or prune-colour of the stalks of its fronds. These fronds are quite smooth, repeatedly forked into two, and furnished with comparatively broad and short leaflets having rounded lobes or segments peculiar through their thickened and recurved nature and glaucous (bluish-green) colour beneath. The sori (spore masses) are composed of capsules disposed three or four together on each side of the midvein.—*Hooker*, *Species Filicum*, i., p. 2, t. 1B. *Nicholson*, *Dictionary of Gardening*, ii., p. 73. *Lowe*, *Ferns British and Exotic*, viii., t. 53.

G. r. glaucescens—glau-ces′-cens (bluish-green), *Moore.*

In this pretty variety the fronds are of the same dimensions as in the type, but their leafy portion is of thicker texture, and their glaucous colour, besides being more conspicuous, is not confined to the under-part only, but spreads all over the surface, and forms a striking contrast with the reddish-purple tint of the stalks.—*Nicholson*, *Dictionary of Gardening*, iv., p. 549.

G. semivestita—se-miv-es-ti′-ta (half-clothed). A variety of *G. circinata.*

G. (Mertensia) simplex—Mer-ten′-sĭ-a ; sim′-plex (simple), *Hooker.*

A singular and distinct, greenhouse species, native of the Andes of Quito and Peru. Its simple (not forked), narrow-spear-shaped fronds are pectinato-pinnatifid (comb-like and divided nearly to the midrib), pointed at their summit, 6in. to 14in. long and ½in. to 1in. broad. The lowest segments spread obliquely from a broad base, and are glaucous (bluish-green) underneath. The sori (spore masses) are composed of from two to four capsules mixed with reddish-brown hairs.—*Hooker*, *Species Filicum*, i., p. 7.

G. speluncæ—spe-lun′-cæ (cavern-loving). A variety of *G. circinata.*

G. (Mertensia) tenera—Mer-ten′-sĭ-a ; ten′-er-a (tender), *Brown.*

A pretty, greenhouse Fern, native of Tasmania, and one which looks very much like a young form of *G. flabellata*, from which, however, it differs

through its dichotomous fronds being borne on scaly stalks and furnished with linear (very narrow), entire segments of a hairy nature. The sori (spore masses) are composed of from three to five capsules, stalkless and disposed on each side of the midvein.—*Hooker*, *Species Filicum*, i., p. 6.

G. tomentosa—to-men-to′-sa (downy). A synonym of *G. pubescens.*

G. (Mertensia) umbraculifera — Mer-ten′-sĭ-a ; um-bra-cul-if′-er-a (umbrella-bearing), *Moore.*

A greenhouse species, of small dimensions, native of South Africa, and very closely related to the New Zealand *G. Cunninghami.* Its fronds, often proliferous and of a soft but fleshy texture, are borne on stalks of a woolly and scaly nature ; they are composed of branches that are dichotomously flabelliform (repeatedly twice-forked and fan-shaped), and are furnished with spear-shaped, comb-like leaflets 4in. to 6in. long, 1in. broad, and slightly glaucous (bluish-green) beneath. Their lobes are very narrow, and the spore masses consist of from three to five capsules disposed together on each side of the midvein.—*Hooker*, *Synopsis Filicum*, p. 13.

G. (Mertensia) vestita—Mer-ten′-sĭ-a ; ves-ti′-ta (clothed), *Blume.*

This is a stout-growing, stove species, native of the Malayan Islands, which may also be looked upon as a large form of *G. revoluta*, with broad and short segments, large chaffy scales and more distinct veins. Its handsome fronds, many times dichotomous (divided into two) and of a somewhat leathery texture, are dark green above and glaucous (bluish-green) beneath ; their leaflets, 6in. to 8in. long, are all deeply pinnatifid (cut down nearly to the midrib), and their oblong and rather obtuse lobes or segments bear on each side of their midvein the sori (spore masses), which are disposed in groups of five large capsules.—*Hooker*, *Species Filicum*, i., p. 10.

GONIOPHLEBIUM—Go-nĭ-oph-leb′-ĭ-um. *See* **Polypodium.**

GONIOPTERIS—Go-nĭ-op′-ter-is. *See* **Polypodium.**

GRAMMITIS—Gram-mi′-tis. *See* **Gymnogramme** *and* **Polypodium.**

G. Ceterach is synonymous with *Asplenium bulbiferum.*

CHAPTER XXII.

GYMNOGRAMME, *Desvaux.*

(Gym-nog-ram′-me.)

Gold and Silver Ferns.

THIS somewhat extensive genus, which contains the majority of what are popularly known as the Gold and Silver Ferns, takes its name from the fact that the linear sori (long and narrow spore masses), not being provided with an indusium (covering), are therefore naked, the word *Gymnogramme* being derived from *gymnos*, naked, and *gramma*, writing. In Hooker and Baker's "Synopsis Filicum" it forms Genus 52, and it is by far the most important division of the tribe *Grammitideæ*. It is almost exclusively composed of plants indigenous in hot climates, requiring under cultivation stove temperature. The genus, however, contains one British representative, *G. leptophylla*, which is found principally in the Channel Islands, and which is distinguished from all the tropical species, not only by its superficial appearance, but also and especially through its short-lived nature, for it is essentially an annual, lasting but a few months in good condition. While the fronds of some of the species are barely a few inches long, those of some others frequently measure from 5ft. to 6ft. in length. The foliage of the various Gymnogrammes differs also quite as much in form as it does in dimensions, some of the species having simple (undivided) fronds, while in others they are pinnate and bipinnate (once or twice divided to the midrib), trifoliolate (with leaflets disposed in threes), or even decompound (many times divided). Their surface, according to the species to which they belong, is either smooth, hairy, or covered

(especially the under-surface) with a farinose powder varying in thickness as well as in depth of colour.

The distinctive characters of the genus reside not only in the naked nature and in the disposition of the sori, which arise from the veins of the under-surface of the fronds, but also in their form, which is linear or linear-oblong, and either simple (undivided) or forked, and in their being irregularly scattered over the entire under-surface of the fronds. They are medial (situated along the veins between the base and the apex), and usually occupy almost the whole length of the venules (minor veins). After a time they become confluent, and when this occurs the proper distribution and arrangement of the spore masses are no longer apparent. The genus as it is now accepted embraces many plants which formerly were classed under different generic names, as follow:

Ceropteris (Ce-rop′-ter-is), *Link.* To this section belong the majority of the Ferns popularly known as Gymnogrammes, and which differ from *Eugymnogramme* only by the fronds being coated with white or yellow powder.

Dictyogramme (Dic-tў-og-ram′-me), *Moore.* The plants belonging to this section are distinguished by the coriaceous (leathery) texture and prominent veins of their fronds. They are provided with underground rhizomes (prostrate stems).

Eugymnogramme (Eu-gym-nog-ram′-me), *Desvaux.* Species with foliage of various forms, from simple to quadripinnatifid (four times divided nearly to the midrib), are included under this head. They have free veins and their under-surface is not powdery.

Leptogramme (Lep-tog-ram′-me), *J. Smith.* A group of Ferns with free veins and elongated sori.

Selliguea (Sel-li′-guĕ-a), *Bory.* The plants of this section have fronds of a leathery texture, simple or compound, with main veins mostly prominent and smaller veins variously and copiously anastomosing (intermixed); they are also distinct through their elongated sori.

Syngramme (Syn-gram′-me), *J. Smith.* The species known by this name are distinct from the plants belonging to the other sections by the veins of their fronds being close, nearly parallel, and united only by transverse veinlets near the margin.

Besides the above recognised sections a few Gymnogrammes have by some authors been referred to the following: *Anogramme*, Link; *Digrammaria*, Presl; *Grammitis*, Blume; *Hecistopteris*, J. Smith; *Heterogonium*, Presl; *Neurogramme*, Link; *Pterozonium*, Fée; *Stenogramme*, Blume. These names have, however, now become obsolete, the plants having been merged into one or the other of the six sections above described.

Culture.

This very popular genus is remarkable for the attractive character of many of its species and varieties, and for the easy mode of cultivation under which some of the most robust kinds, at least, thrive admirably. The Gymnogrammes form the nucleus of that most interesting group, the Gold and Silver Ferns, the under-side of the foliage of many of them being covered with farina of a colour varying from the purest white to shades of yellow of different degrees of intensity. Sometimes, in fact, plants are found which bear fronds suffused with white and yellow powder at the same time: this sort of dimorphism in colours may frequently be observed in forms derived from the *calomelanos* type, which also sometimes produce fronds provided with the usual covering on one half, whereas the other portion is completely destitute of the coloured powder. Such instances, however, can only be regarded as curiosities. The same remark is also applicable to the varieties with forked or crested fronds, which under cultivation Gymnogrammes have a peculiar tendency to produce: of these *G. calomelanos chrysophylla Parsonsii* and *G. pulchella Wettenhalliana* are excellent examples. Then there are also a few kinds, such as *G. rufa*, *G. tomentosa*, *G. vestita*, &c., which are totally devoid of any powder whatever, and in which that principal ornament is replaced by a covering of reddish or silvery hairs, giving the plants a tomentose (downy) aspect that is very attractive. All the species are very ornamental, and the majority of them can be grown with great success in hanging baskets, in which they show their beautiful colours to perfection. This way of cultivating them is really the most suitable, where it is practicable, as these plants are fond of light and also of an atmosphere drier than that found in the ordinary Fernery or the warm plant-house. However, owing to their great size and robust growth, some kinds can only be grown in pots.

Gymnogrammes should be potted firmly in light material, made up of two parts of fibrous peat, one of leaf mould (where this is not readily procurable, the same quantity of finely-chopped sphagnum-moss may be substituted), and one of silver sand. Those grown in pots should not be mixed among other Ferns, but be kept by themselves and out of reach of the water from the syringe, as they not only suffer from the effects of watering overhead, but also present a wretched appearance, the white or yellow meal being easily displaced by the slightest sprinkling of water. They grow very well and get much better coloured if kept without, or with only very light, shading, the light, however strong, never being too much for them, provided they have been accustomed to it from the first, and that plenty of ventilation is afforded. Although particularly fond of a dry atmosphere, Gymnogrammes are plants which suffer very much if water at the roots is not freely administered, and lax treatment in this respect often accounts for the poor state and diminutive size in which one sometimes sees them in general collections.

Gymnogrammes are readily propagated from their spores, which germinate freely and make handsome specimens in a comparatively short time.

Fig. 52. Back of Frond of Gymnogramme alismæfolia (⅔ nat. size).

Principal Species and Varieties.

G. (Selliguea) abyssinica—Sel-li′-guĕ-a ; ab-yss-in′-ic-a (Abyssinian), *Baker*.

A stove species, of medium dimensions, native of Abyssinia, and provided with wide-creeping rhizomes (stems), from which simple (undivided) fronds are abundantly produced. These fronds are lanceolate (spear-shaped), 1ft. long and about ½in. broad, narrowed to a point at their summit and gradually downwards to a short,

compressed stalk; they are of a somewhat leathery texture, yet not at all rigid, and both surfaces are green and smooth. The sori (spore masses), narrow-oblong and about ¼in. long, are placed near the midrib, distant from one another, and occupy a slightly oblique position.—*Hooker*, *Synopsis Filicum*, p. 517.

G. (Syngramme) alismæfolia—Syn-gram′-me; al-is-mæ-fol′-ĭ-a (having fronds like Alisma or Water-Plantain), *Hooker.*

This is a singular-looking, stove species, native of Singapore and the Philippine Islands. Its fronds, 5in. to 8in. long and 2in. to 3in. broad, of a somewhat leathery texture and smooth on both sides, are oblong in shape, pointed at the summit, rounded at the base, and have their edge entire; they are borne on firm, glossy stalks 6in. to 18in. long and of a chestnut-brown colour. The sori (spore masses) extend on all the veins, from the midrib to where they join. Fig. 52 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker*, *Species Filicum*, v., p. 154. *Beddome*, *Ferns of British India*, t. 240.

G. Alstoniæ—Als-to′-nĭ-æ (Mrs. Alston's). A form of *G. calomelanos chrysophylla.*

G. (Eugymnogramme) Andersoni—Eu-gym-nog-ram′-me; An-der-so′-ni (Anderson's), *Beddome.*

Fig. 53. Gymnogramme Andersoni (½ nat. size).

A greenhouse species, of small dimensions, native of Kumaon, where, according to Beddome, it is found growing on dry rocks in the Sooda-dunga Valley at 13,000ft. elevation. Its little fronds, seldom more than 2in. long and ½in. broad, and of a thin, papery texture, are composed of four or five pairs of leaflets and a terminal one, all sessile (stalkless), roundish, and bluntly lobed; they are borne on stalks 1in. to 2in. long, densely clothed with soft, golden hairs, which are also noticeable on both surfaces of the leafy portion. The sori (spore masses) are very narrow. Fig. 53

is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker*, *Synopsis Filicum*, p. 380. *Beddome*, *Ferns of British India*, t. 190.

G. (Eugymnogramme) angustifrons—Eu-gym-nog-ram′-me ; an-gus′-tif-rons (narrow-fronded), *Baker*.

A stove species, native of the Andes of Ecuador and Peru. It is distinct from all others through its ligulate (strap-shaped) fronds, 6in. to 12in. long and ½in. broad, which are borne on tufted, wiry, glossy stalks 2in. to 4in. long and of a dark chestnut-brown colour ; they are bipinnatifid (twice divided half-way to the midrib), and their leaflets, of a somewhat leathery texture and furnished with blunt, rounded lobes, are usually set a little apart, leaving between them a space equal to their own breadth. The sori (spore masses) are oblong.—*Hooker*, *Synopsis Filicum*, p. 380.

G. (Ceropteris) argentea—Ce-rop′-ter-is ; ar-gen′-tĕ-a (silvery), *Mettenius*.

This very pretty, stove species, of dwarf habit, is a native of Natal and the Mascarene Islands. Its elegant little fronds, borne on slender, glossy stalks 3in. to 6in. long and of a chestnut-brown colour, are somewhat similar in shape to the Greek delta, Δ, and quadripinnatifid (four times divided half-way to the midrib). Their leaflets, which are not very numerous and are frequently distant, are of the same shape as the frond, the lower ones being 3in. to 4in. long and 2in. broad ; the sub-divisions of these (leafits and segments) are of similar shape and of a soft, papery texture. The under-side is coated with a white powder, sometimes tinged with red, while the sori (spore masses) are of a peculiar pale brown colour. *G. aurea* of Desvaux is a variety with yellow powder, found in Madagascar, Bourbon, and Angola. —*Hooker*, *Synopsis Filicum*, p. 385.

G. (Eugymnogramme) ascensionis—Eu-gym-nog-ram′-me ; as-cen-sĭ-o′-nis (from Ascension Island), *Hooker*.

This is a little, annual species, with fronds 2in. to 3in. long, 1in. to 1½in. broad, and tripinnatifid (three times divided half-way to the midrib) ; they are of a thin, papery texture, and are borne on slender, thread-like stalks 1in. to 2in. long and of a chestnut-brown colour. The sori (spore

masses) are long and narrow, and disposed one to each ultimate lobe. As its name implies, this pretty little species is a native of Ascension Island.—*Hooker*, *Species Filicum*, v., p. 136.

G. (Stenogramme) aspidioides—Sten-og-ram′-me ; as-pid′-ĭ-ŏ-i′-dēs (Aspidium-like), *Hooker*.

A stove species, native of Khasya, Ceylon, and Java, where, according to Beddome, it is found growing at elevations varying between 4000ft. and 6000ft. The fronds are oblong-spear-shaped, 1ft. to 1½ft. long, 6in. to 10in. broad, and simply pinnate (only once divided to the midrib) ; their spear-shaped leaflets, 3in. to 5in. long and about 1in. broad, are bluntly lobed, and more or less hairy on both surfaces. The stalks on which these fronds are borne are hairy and 6in. to 9in. long.—*Hooker*, *Species Filicum*, v., p. 150. *Beddome*, *Ferns of British India*, t. 149.

G. (Leptogramme) asplenioides—Lep-tog-ram′-me ; as-ple′-nĭ-ŏ-i′-dēs (Asplenium-like), *Kaulfuss*.

In this greenhouse species, native of Panama and South Brazil, the fronds, which are produced from a stout and somewhat upright-growing rhizome (stem), are borne on hairy stalks 2in. to 6in. long and scaly at the base, and are bipinnatifid (twice divided half-way to the midrib) ; they are 6in. to 12in. long and 3in. to 4in. broad, and are furnished with horizontal, sessile (stalkless) leaflets 1½in. to 2in. long, about ½in. broad, varying from nearly entire to cut more than half-way down to the midrib in the lower part, of a papery texture, and with midribs slightly hairy on both sides. The sori (spore masses) are oblong in shape.—*Hooker*, *Species Filicum*, v., p. 132.

G. aurea—au′-rĕ-a (golden). A variety of *G. argentea*.

G. (Eugymnogramme) aureo-nitens—Eu-gym-nog-ram′-me ; au′-rĕ-o-nit′-ens (golden and shining), *Hooker*.

A stove species, of medium size, native of Peru, and thoroughly distinct through the rachis (stalk of the leafy portion) of its fronds being very flexuose (zigzag). These fronds are borne on stout stalks, densely clothed with dark, rusty-coloured wool, and are tripinnatifid (three times divided half-way to the

midrib). The leaflets are distinctly stalked, spear-shaped, 4in. to 6in. long, 2in. to 3in. broad, and cut down into irregular, almost triangular pinnules (leafits) with blunt lobes ; their under-surface is densely matted with wool of a bright rusty colour, in which the elongated, simple (undivided) or forked, sori (spore masses) are hidden.—*Hooker*, *Species Filicum*, v., p. 130.

G. (Leptogramme) aurita—Lep-tog-ram′-me ; au-ri′-ta (eared), *Hooker*.

This greenhouse species, which has altogether the habit and texture of a Polypodium, is a native of North India, Khasya, Mumbree, Muncklow, and Lachen, where, according to Beddome, it is found at an altitude of 6000ft. Its fronds, 1½ft. to 2ft. long and 8in. to 12in. broad, are produced from a creeping rhizome (stem) and borne on naked, glossy stalks about 1ft. long and of a chestnut-brown colour ; they are bipinnatifid or bipinnate, the leaflets, disposed in distant pairs, being cut down sometimes nearly, sometimes quite, to the midrib into spear-shaped lobes, the lowest on one or on both sides longer than the rest and pinnatifid (cleft nearly to the midrib). The oblong sori (spore masses) are disposed on the forks of the veins.—*Hooker*, *Species Filicum*, v., p. 141. *Beddome*, *Ferns of British India*, t. 152.

G. (Syngramme) borneensis—Syn-gram′-me ; bor-ne-en′-sis (Bornean), *Hooker*.

A singular, stove species, of small dimensions, native of Borneo. Its sub-sessile (almost stalkless) fronds are produced from a creeping rhizome (stem) of a woody nature and densely clothed with nearly black scales ; they are from 4in. to 6in. long, about ½in. broad, strap-shaped, and narrowed to both ends, the edge being very slightly toothed ; the fertile ones are narrower than the barren ones, and both are of a leathery texture The copious and conspicuous sori (spore masses) do not reach quite to the edge.—*Hooker*, *Species Filicum*, v., p. 154, t. 301.

G. (Ceropteris) calomelanos—Ce-rop′-ter-is ; cal-om-el′-an-os (beautiful black, in allusion to the colour of the stalks), *Kaulfuss*.

This very handsome, robust-growing, and extremely variable, stove species is a native of the West Indies, extending southward to Rio Janeiro, Peru, and Samoa ; also of the Tropical West African Islands. It is one of the

largest-growing kinds of Gold and Silver Ferns; its oblong-triangular fronds, 1ft. to 3ft. long and 6in. to 12in. broad, being borne on firm, very nearly black, shining, tufted stalks 6in. to 12in. long. These fronds spring from all round the crown of the rhizome (prostrate stem), bending outwards, and leaving the plant very hollow in the centre. The spear-shaped leaflets (Fig. 54), often cut down quite to the midrib, are closely set, 6in. long and 1½in. to 2in. broad; they are divided into distinct, toothed pinnules (leafits) of a somewhat leathery texture, dull green on the upper side, but entirely covered underneath with creamy-white farinose powder. The sori (spore masses) are branched, oblique, and confluent, nearly covering each segment. See Coloured Plate.—*Hooker*, *Synopsis Filicum*, p. 385. *Nicholson*, *Dictionary of Gardening*, ii., p. 104. *Lowe*, *Ferns British and Exotic*, i., t. 11.

Fig. 54. Pinna of Gymnogramme calomelanos (nat. size).

According to Baker, this species includes a variety of forms, some of which are usually considered in gardens as so many species: they are connected by very gradual shades of colour of the powder with which their under-side is covered, and which forms their most attractive character. Among these varieties we particularly note the following:

G. c. chrysophylla—chry-soph-yl′-la (golden-leaved), *Kaulfuss.*

In reference to this plant, Lowe, in his extensive work, "Ferns British and Exotic" (vol. i., p. 3), says: "Of all the Ferns cultivated in Great Britain, perhaps no species is so universally admired as the *Gymnogramme chrysophylla*, the 'King of the Gold Ferns.' Its graceful habit of growth, added to the farinose powder covering the whole of the under-side of the fronds, and the rich golden appearance of the young stems, are attractions of no ordinary character—attractions which cannot fail to strike even the most

casual observer, and especially when the plant is in full fructification; for the dark-coloured seed-vessels protrude through this golden covering, and thus heighten the effect produced by this singularly beautiful species." According to the same authority, this Fern is a native of South America and the West Indies, being found abundantly in the Islands of Martinique and San Domingo; it is consequently a stove plant. Its fronds (Fig. 55), which are produced from a closely-set crown, are 1½ft. to 2ft. long, including the stout stalks on which they are borne, and which keep them in a nearly erect position, giving the whole plant the appearance of a golden shuttlecock, and showing their under-side to great advantage. —*Hooker*, *Species Filicum*, v., p. 148. *Nicholson*, *Dictionary of Gardening*, ii., p. 104. *Lowe*, *Ferns British and Exotic*, i., t. 10.

Fig. 55. Frond of Gymnogramme calomelanos chrysophylla (much reduced).

Under cultivation, this interesting variety (usually considered a species) has produced many handsome and decorative sub-varieties; the principal ones, and those most worthy of cultivation, are here given:

G. c. c. Alstoniæ — Als-to′-nĭ-æ (Mrs. Alston's), *Moore*.

A Fern most distinct in general aspect, though of the same upright habit as *G. c. chrysophylla*. The peculiarity which greatly enhances the beauty of the plant, and which renders it distinct from any other form, is the way in which nearly all its leaflets are turned upwards and gracefully incurved, making the upper side of the fronds appear as if dotted all over with little golden globules. It is also an exceedingly good grower.

G. c. c. grandiceps—gran′-dic-eps (large-headed), *Moore*.

A beautiful, crested form of *G. chrysophylla*, to which it is similar in size and habit, and from which it differs only in the large crests terminating the

fronds, and in the smaller ones at the end of each of the leaflets.—*Nicholson*, *Dictionary of Gardening*, iv., p. 550.

G. c. c. Laucheana—Lauch-ĕ-a′-na (Lauche's), *Moore*.

This is a beautiful and symmetrical form, of dense habit. The fronds are quite triangular in shape, and are borne on stout stalks only sufficiently long to give them a gracefully-arching appearance, rendering it a most valuable Fern for decoration. The under-side of the fronds is of a particularly bright and uniform golden colour, which is retained as long as they remain on the plants. Several forms of *G. c. c. Laucheana*, and notably the one called *gigantea*, with fronds much longer but not triangular, are highly decorative, and even surpass the variety from which they have sprung.

G. c. c. L. grandiceps—gran′-dic-eps (large-headed), *Moore*.

Perhaps this is the most striking, if not literally the handsomest, of all known Gold Ferns. Its fronds, less triangular than those of *G. c. c. Laucheana*, are bipinnate (twice divided to the midrib), and terminate in a broadly-tasselled, drooping apex ; their under-side is thickly covered with meal of a palish yellow colour, and their segments, instead of being pointed as usual, are blunt at the end. This sub-variety is best propagated by division of the crowns, as seedlings seldom reproduce the plant in its true characters.—*Nicholson*, *Dictionary of Gardening*, iv., p. 550.

G. c. c. L'Herminieri—L'Her-min-ĭ-e′-ri (L'Herminier's), *Kunze*.

Undoubtedly this is the prettiest of the many light sub-varieties or forms of *G. c. chrysophylla*, than which it is slenderer and smaller ; its leaflets are also broader at the base and more contracted at their extremity, and the farinose powder on their under-side is darker in colour than that of *G. sulphurea*. On account of its slender habit and its light colour, the general appearance of this form is very much that of a plant half-way between *G. sulphurea* and *G. c. chrysophylla*. According to Lowe, *G. c. c. L'Herminieri* is a native of Guadeloupe, one of the largest of the Caribbee Islands.—*Lowe*, *Ferns British and Exotic*, i., p. 24, t. 9.

G. c. c. Martensii—Mar-tens′-ĭ-i (Martens's), *Link*.

The fronds of this handsome form are from 1ft. to 1½ft. long ; the colour of the upper surface is a dull yellowish-green, whilst beneath they are

profusely covered with a rich yellow powder. They are bipinnate (twice divided to the midrib) and furnished with spear-shaped leaflets and roundish pinnules (leafits), the segments of which are conspicuously toothed. The colour of the stalks is a shining brownish-red. We have it on the authority of E. J. Lowe that Link considered this Fern as a hybrid variety between *G. calomelanos* and the variety *G. c. chrysophylla;* also, that under similar cultivation *G. c. chrysophylla* is less in size, more triangular in form, has the pinnules more expanded, and is not so sharply pointed at the extremities of the leaflets.—*Lowe, Ferns British and Exotic*, i., t. 1.

Fig. 56. Gymnogramme calomelanos peruviana (greatly reduced).

G. c. c. Massoni—Mas-so′-ni (Masson's), *Link.*

This variety is very remarkable on account of the length of its fronds, which are spear-shaped, handsomely golden beneath, somewhat loose, and of a pendulous habit, making it an excellent plant for large hanging baskets.

G. c. c. Parsonsii—Par-son′-sĭ-i (Parsons's), *Moore.*

A beautifully-crested form, of comparatively dwarf dimensions, with fronds seldom exceeding 1ft. in length, and covered on their underside with a beautiful dark yellow powder. They are of a very upright habit, their extremity being formed into a broad but finely-divided tassel, while each leaflet terminates in a crest, becoming smaller as they reach the base of the fronds. This variety is very variable in its mode of fructification, some plants producing fronds with more or less flattened crests. It is very liable to damping-off through excessive or accumulation of moisture in the crests of the fronds during the winter, when it must be kept in a particularly dry place, and as close to the light as possible.

G. c. peruviana—per-u-vĭ-a′-na (Peruvian), *Desvaux.*

Notwithstanding the entirely different habit of this Fern when compared with *G. calomelanos*, it has been deemed advisable by Baker to retain it as simply a variety of that species. Its fronds, smaller and more triangular in form, are borne on stout stalks of a light chestnut colour; their lower leaflets are quite deltoid (in shape of the Greek delta, Δ), and their lower pinnules (leafits) often cut down to the midrib.—*Hooker*, *Synopsis Filicum*, p. 385. *Nicholson*, *Dictionary of Gardening*, ii., p. 104.

G. c. p. argyrophylla—ar-gyr-oph-yl′-la (silvery-leaved), *Moore.*

This exceedingly handsome sub-variety is the Silver Fern *par excellence*, and no description can over-rate its merits. Its splendid fronds, 1½ft. to 2½ft. long, are very massive and broad at their base; they are bipinnate (twice divided to the midrib), and their closely-set leaflets are also broad and obtuse. In addition to its other decorative qualities, the fact of the silvery appearance not being restricted to the under-surface of the fronds is well worthy of special mention, for the dense, farinose, pure white powder covers their upper surface as well, and on that account the plant is all the more likely to suffer if its foliage gets wetted over. It is of excellent habit, and on a specimen in good health the thickness of the white powder on the upper surface is such that nearly all traces of green have disappeared and the fronds have become of a bluish-white.—*Lowe*, *Ferns New and Rare*, p. 13, t. 6.

G. c. p. Mayii—May′-ĭ-i (May's), *May.*

In habit as well as in general aspect this is very similar to the variety *argyrophylla*, but the farinose powder with which its fronds are covered on both surfaces, instead of being a pure white, is of a light sulphur-yellow, and is also noticeable, though in less quantity, on the entire surface of the stalks.

G. (Eugymnogramme) caracasana—Eu-gym-nog-ram′-me; car-ac′-as-a′-na (from Caracas), *Klotzsch.*

A stove species, native of the Andes of Venezuela and New Granada. It has oblong-spear-shaped fronds 4in. to 6in. long and three times divided halfway to the midrib. The closely-set leaflets are straight and short-stalked, and their pinnules (leafits), of similar nature, are again divided into obliquely

broad-egg-shaped, blunt segments densely clothed on both sides with firm, spreading hairs, especially on the main ribs. The spore masses eventually fill up the whole of the lobes except a narrow border.—*Hooker*, *Synopsis Filicum*, p. 516.

G. (Selliguea) caudiformis — Sel-li′-guĕ-a ; cau-dif-or′-mis (tail-like), *Hooker.*

This singular, stove species, native of Moulmein, the Malayan and Polynesian Islands, and New Caledonia, produces from a creeping rhizome (stem) of a woody nature, and clothed with large, spear-shaped, pale brown scales, its curious, leathery fronds : these are of two distinct sorts, though both are borne on firm, erect, glossy, pale brown stalks 6in. to 9in. long ; they are naked on both sides, 6in. to 9in. long, and the barren ones are 3in. to 4in. broad, whereas the fertile ones are seldom 2in. broad. The sori (spore masses) are disposed in one continuous or interrupted row between the main veins.—*Hooker*, *Species Filicum*, v., p. 158. *Nicholson*, *Dictionary of Gardening*, ii., p. 104. *Botanical Magazine*, t. 5328.

G. (Eugymnogramme) chærophylla — Eu-gym-nog-ram′-me ; chæ-roph-yl′-la (Chervil-leaved), *Desvaux.*

Although undoubtedly a Gymnogramme, this elegant, stove species, native of the West Indies, Brazil, and various parts of South America, in general appearance differs materially from most other members of the same genus, having the delicate, fragile appearance of the plants belonging to *Cystopteris*. Its delicate fronds, of a soft, papery texture, are deltoid (in shape of the Greek delta, Δ) and borne on slender stalks 3in. to 6in. long, green upwards, chestnut-brown near the base ; they are quadripinnatifid (four times divided half-way to the midrib), with lower leaflets and leafits deltoid and further divided into flabellate (fan-shaped) segments ; their colour is a pale, bright green, and the whole of the under-side is covered by the sori (spore masses), which are light brown in colour and disposed in close lines, one to each of the divisions, which are confluent in the centre of the segments. Fig. 57 was drawn from a specimen at the Royal Gardens, Kew ; but the general appearance of the plant is usually lighter, the lobes being much narrower than in our engraving.—*Hooker*, *Species Filicum*, v., p. 136. *Nicholson*, *Dictionary of Gardening*, ii., p. 104. *Lowe*, *Ferns British and Exotic*, i., t. 8.

G. chærophylla is a rare exception among Ferns, being an annual instead of a perennial; but although of only short duration it produces fertile fronds in abundance, and as the spores germinate freely, it makes its reappearance in various parts of the house where the plants have grown during the previous season.

Fig. 57. Frond of Gymnogramme chærophylla (nat. size).

G. (Eugymnogramme) cheilanthoides—Eu-gym-nog-ram′-me; cheil-anth-ŏ-i′-dēs (Cheilanthes-like), *Kaulfuss.*

A stove species, of small dimensions, native of Mauritius and Tristan d'Acunha. Its fronds are ligulate (strap-shaped), three times divided half-way to the midrib, 6in. to 10in. long, 1in. broad, and borne on slender, wiry,

glossy, dark chestnut-brown stalks 3in. to 6in. long. The leaflets are closely set, triangular, ½in. long and nearly as broad, the upper lobes undivided, narrow-oblong, the lower ones forked or trifid (thrice-cleft), of a soft, papery texture, and with both surfaces slightly hairy. The sori (spore masses) are oblong.—*Hooker*, *Species Filicum*, v., p. 135.

G. chrysophylla — chry-soph-yl′-la (golden-leaved). Although usually considered a species, this is a variety of *G. calomelanos.*

G. (Eugymnogramme) cordata — Eu-gym-nog-ram′-me ; cor-da′-ta (heart-shaped), *Schlechtendahl.*

A very singular, stove species, native of Cape Colony and Bourbon Island, with somewhat egg-shaped fronds 3in. to 6in. long, 1½in. to 2in. broad, and bipinnatifid (twice divided half-way to the midrib); they are borne on black, glossy stalks 1in. to 2in. long and more or less scaly. The leaflets are oblong, with a broad centre and nearly round, deeply-toothed lobes, of a somewhat leathery texture, the upper surface of which is naked, while their under-side is densely coated with scales of a rusty-brown colour. The sori (spore masses), which are at first linear (long and narrow), eventually become confluent and cover the greater portion of the leaflets (Fig. 58). The less-divided forms resemble *Asplenium Ceterach* in habit.—*Hooker*, *Species Filicum*, p. 131.

Fig. 58. Gymnogramme cordata (½ nat. size).

G. dealbata—dĕ-al-ba′-ta (whitened). Synonymous with *G. tartarea.*

G. (Eugymnogramme) decomposita—Eu-gym-nog-ram′-me ; de-com-pos′-it-a (decompound, much divided), *Baker.*

This finely-divided, strong-growing, stove species, native of South America, suggests, by its habit, as well as by the nature of its fronds, which are fully 1½ft. long and 1ft. broad, a natural hybrid between the lovely *G. Pearcei* and the golden *G. calomelanos chrysophylla.* Indeed, it has been reported and described as having thus originated in the late Mr. Gair's collection in Scotland. Baker, however, gives it as a species "probably Andine," and Nicholson as a "native of South America, introduced in 1873." Be that as it may, species or variety, *G. decomposita* is a remarkably handsome and totally distinct Fern with somewhat the habit of *G. pulchella*, but when in a young state much more finely divided and scantily furnished with powder: this powder is white, or nearly so, but as the plant gets older it becomes of a bright yellow and covers the stalks, but seldom extends to the leafy portion of the fronds, in this respect resembling the finely-cut *G. Pearcei.* Like those of that species, its fronds are quadripinnatifid (four times divided nearly to the midrib), and their closely-set and triangular leaflets are longest at the base of the frond ; these leaflets have a peculiarly elegant aspect (Fig. 59 and Plate), being divided into small pinnules that are again split into several minute, finger-like divisions or lobes, giving the whole plant a finely-dissected appearance. The slender and conspicuous sori (spore masses) are confluent where the lobes join, running up into them. The plant reproduces itself freely from spores.—*Hooker, Synopsis Filicum*, p. 517. *Nicholson, Dictionary of Gardening*, ii., p. 104.

Fig. 59. Gymnogramme decomposita (much reduced).

G. (Leptogramme) diplazioides — Lep-tog-ram′-me ; dip-laz-ĭ-ŏ-i′-dēs (Diplazium-like), *Desvaux.*

A stove species, native of Mexico and the West Indies, with fronds 1½ft. to 2ft. long, bipinnatifid (twice divided half-way to the midrib), and borne on glossy stalks 3in. to 4in. long and scaly below. The central leaflets, 3in. to 4in. long and ¾in. to 1in. broad, are cut about two-thirds of the way down into blunt, entire lobes, the lower ones being gradually reduced ; they are of a soft, papery texture, and the oblong sori (spore masses) often reach nearly from the midrib to the edge.—*Hooker*, *Species Filicum*, v., p. 140.

G. elegantissima—e-leg-an-tis′-sim-a (very elegant), *Bull.*

This is an exceedingly graceful plant, having all the appearance of a form of *G. schizophylla.* The accompanying Plate is reproduced from Mr. W. Bull's Catalogue for 1890, from which we also extract the following description : "A very elegant, new, stove Fern, with beautifully-arching, finely-cut fronds, of a pleasing green colour and firm texture. The rachides (stalks of the leafy portion) are of a dark reddish-brown colour, the pinnæ (leaflets) being divided and subdivided into numberless minute, emarginate (notched) segments, the whole plant presenting a most attractive appearance. From its graceful habit of growth and its long, elegantly-recurving fronds, this variety is admirably adapted for cultivation in suspended baskets, as well as for other decorative and ornamental purposes." The plant originated accidentally among a batch of seedlings in a British collection.

G. (Selliguea) elliptica—Sel-li′-guĕ-a ; el-lip′-tic-a (elliptic), *Baker.*

This greenhouse species has a very wide range of habitat, being found on the Himalayas at 6000ft. elevation, in Japan, and southward to Moulmein, the Philippines, and Queensland. Its fronds, of a soft, papery texture, 1ft. to 1½ft. long and 6in. to 9in. broad, are cut down nearly to the rachis (stalk of the leafy portion) in the upper, and quite in the lower, part into four to six narrow-oblong or elliptic leaflets on each side ; they are produced from a wide-creeping rhizome (decumbent stem) of a woody nature, and borne on firm, erect, naked stalks 1ft. or more in length. The narrow, oblique sori (spore masses) reach the midrib but not the edge.—*Hooker*, *Species Filicum*, v., p. 161. *Beddome*, *Ferns of British India*, t. 150.

G. Selliguea Féei—Sel-li′-guĕ-a ; Fé′-ĕ-i (Fée's), *Hooker.*

A stove species, of small dimensions, native of the Malay Islands and Peninsula, and, according to Beddome, extending from Penang and Singapore to Java and Borneo. Its fronds, which are produced from a firm, wide-creeping rhizome (stem) furnished with scales of a particularly bright brown colour, are dimorphous (of two forms) : the barren ones, 3in. to 4in. long, 1½in. to 2in. broad, and oblong-egg-shaped, are borne on stalks 1in. to 3in. long ; while the fertile ones, a little longer and narrower, are borne on longer stalks. Both kinds are entire (undivided), sharp-pointed, of a leathery texture, and smooth on both sides. The narrow-oblong sori (spore masses) are disposed in single rows between the main veins, not reaching either the midrib or the edge. Its conspicuous venation renders this species very interesting. Fig. 60 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker*, *Species Filicum*, v., p. 158. *Beddome*, *Ferns of British India*, t. 151.

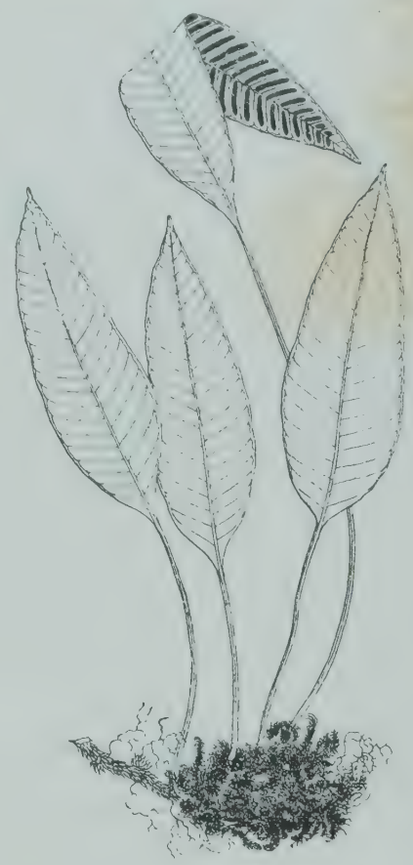


Fig. 60. Gymnogramme Féei
(⅓ nat. size)

G. (Eugymnogramme) ferruginea — Eu-gym-nog-ram′-me; fer-ru-gin′-ĕ-a (rusty), *Kunze.*

In this very singular-looking species, native of Peru and Panama, the principal attraction resides in the stout, tufted stalks, which are densely clothed with woolly down of a rusty-brown colour. The fronds, 1ft. or more long and 3in. to 4in. broad, are bipinnate (twice divided to the midrib), their leaflets, 2in. to 3in. long, ½in. to 1in. broad, and of a somewhat leathery texture, being cut down to the midrib below into oblong or narrow-oblong, entire or slightly-toothed lobes or pinnules. Their upper surface is naked, while their lower one is densely coated with a woolly material similar to that noticed on the stalks. The sori (spore masses) are lax (loose), simple or forked.—*Hooker*, *Species Filicum*, v., p. 138. *Nicholson*, *Dictionary of Gardening*, ii., p. 104.

G. f. lanata—la-na′-ta (woolly), *Klotzsch.*

This variety differs from the above species through its larger pinnules or lobes, which are less woolly beneath; and also on account of its lower pinnules being bluntly lobed half-way down.—*Nicholson*, *Dictionary of Gardening*, ii., p. 104.

G. (Eugymnogramme) flabellata—Eu-gym-nog-ram′-me; fla-bel-la′-ta (fan-shaped), *Hooker.*

A stove species, of medium size, native of the Andes of Ecuador. Its curious fronds, 8in. to 12in. long and 1½in. to 2in. broad, are borne on wiry stalks 3in. to 4in. long, of a dark chestnut-brown colour and glossy; they are composed of leaflets 1in. to 1½in. long and ¼in. to ½in. broad, which have their lower pinnules (leafits) stalked, as broad as long, fan-shaped, and deeply cut into oblong- blunt lobes. The sori (spore masses) are disposed one to each lobe, and become confluent in the centre of the pinnules.—*Hooker*, *Species Filicum*, v., p. 134.

G. (Eugymnogramme) flexuosa—Eu-gym-nog-ram′-me; flex-ŭ-o′-sa (wavy), *Desvaux.*

A strong-growing, stove species, of scandent (climbing) habit, native of Central America, its habitat extending from Nicaragua to Peru. The fronds, 3ft. to 4ft. long and tri- or quadripinnate (three or four times divided to the midrib), are borne on glossy, slender stalks 6in. to 18in. long and of a chestnut-brown colour; their rachises (stalks of the leafy portion) are zigzag and branched. The leaflets, nearly triangular in outline, are reflexed (thrown back), and show some fan-shaped segments, with very narrow divisions of firm, papery texture, each of them bearing a solitary oblong sorus (spore mass). —*Hooker*, *Species Filicum*, v., p. 129. *Nicholson*, *Dictionary of Gardening*, ii., p. 104.

G. (Eugymnogramme) Gardneri—Eu-gym-nog-ram′-me; Gard′-ner-i (Gardner's), *Baker.*

A stove species, native of Brazil, and very distinct in outward appearance through its fronds, borne on chestnut-coloured, hairy stalks 6in. to 12in. long, being deltoid and tripinnatifid (in shape of the Greek delta, Δ, and three times

divided half-way to the midrib). They are from 3in. to 4in. each way, with their lower leaflets much the longest, 2in. to 2½in. broad; these are again deeply cleft into short, blunt lobes. The leafy portion is green and hairy on both surfaces, and the sori (spore masses) run along all the veins covering the whole of the under-surface.—*Hooker, Synopsis Filicum*, p. 515.

G. gloriosa—glo-rĭ-o′-sa (glorious). A variety of *G. schizophylla*.

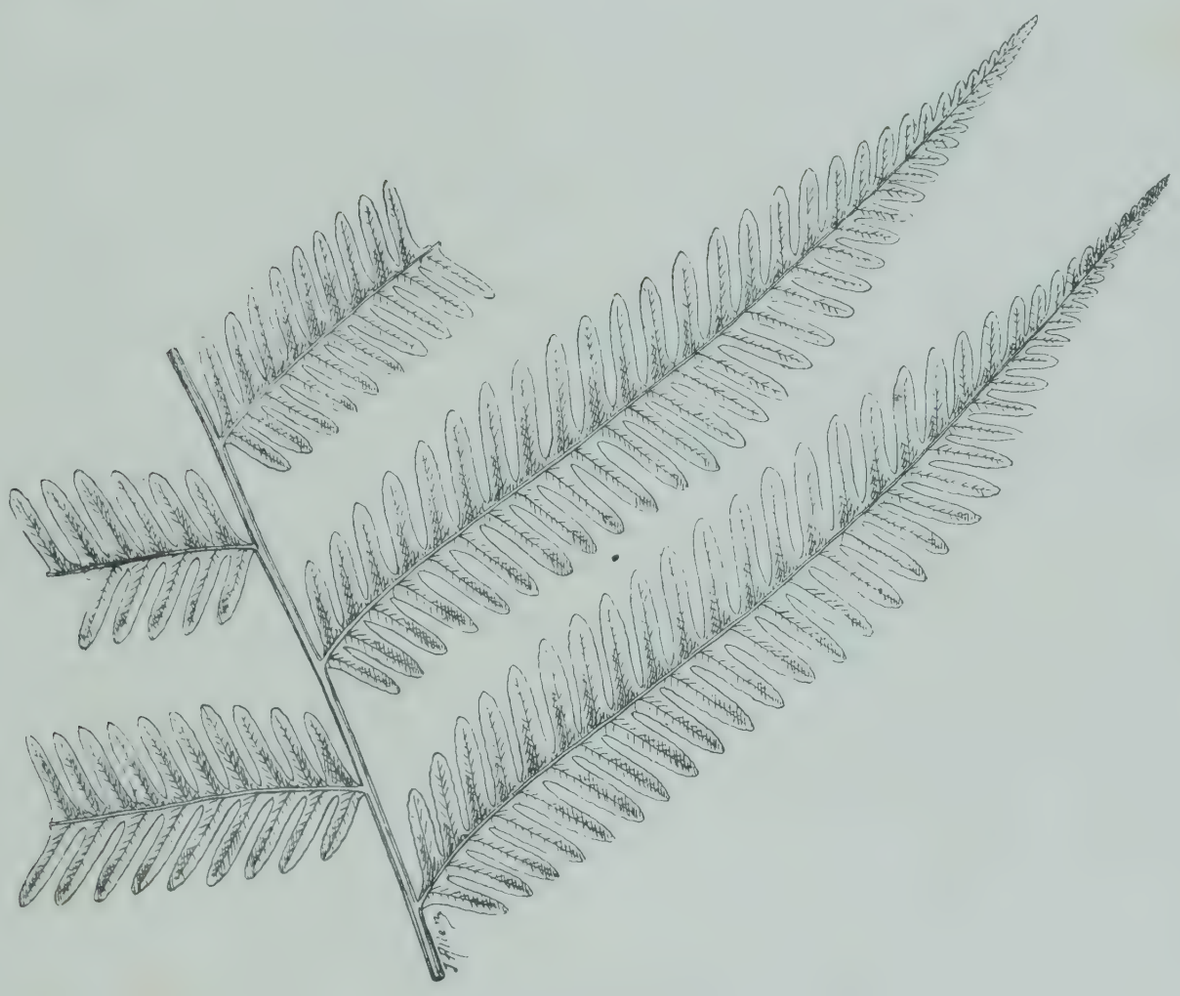


Fig. 61. Portion of Frond of Gymnogramme gracilis
(½ nat. size).

G. (Leptogramme) gracilis — Lep-tog-ram′-me; grac′-il-is (slender), *Heward*.

This very elegant, stove species, native of Jamaica and Guadeloupe, has handsome fronds 2ft. to 4ft. long, 1ft. or more broad, and bipinnatifid (twice divided nearly to the midrib); they are borne on short, glossy stalks of a scaly nature, seldom more than 4in. long. The central leaflets, 4in. to 8in. long and 1in. to 1½in. broad, are cut down very nearly to the midrib

into entire and slightly sickle-shaped lobes of a soft, papery texture. The sori (spore masses) are disposed nearer the edge than the midrib.—*Hooker*, *Species Filicum*, v., p. 139, t. 292.

G. (Leptogramme) grandis — Lep-tog-ram′-me ; gran′-dis (great), *Baker*.

A gigantic-growing, stove species, native of the Andes of Columbia and Ecuador, with fronds bipinnatifid (twice divided half-way to the midrib), 3ft. to 4ft. long, 1½ft. to 2ft. broad, and borne on strong, naked stalks 1½ft. to 2ft. long and scaly only at the very base. The leaflets, 8in. to 12in. long and 1½in. broad, are cut three-quarters of the way down to the rachis (stalk of the leafy portion) into oblong-sickle-shaped, finely-toothed, somewhat leathery lobes. The linear sori (long and narrow spore masses) are disposed close to the midrib.—*Hooker*, *Synopsis Filicum*, p. 377.

G. (Selliguea) Hamiltoniana—Sel-li′-guč-a ; Ham-il-to-nĭ-a′-na (Hamilton's), *Hooker*.

A stove species, native of the East Himalayas, producing from a wide-creeping rhizome (stem) of a woolly nature and covered with dull-brown, linear (long and narrow) scales, fronds of two different forms : the barren ones, 1ft. long, 3in. to 4in. broad, spathulate (spoon-shaped), and are borne on stalks 2in. to 3in. long ; while the fertile ones, 4in. to 6in. long and 1½in. broad, are borne on slender, naked stalks 1ft. or more long. Both fronds are of a somewhat leathery texture, and the sori (spore masses) are disposed in broad, continuous rows, one between each main vein.—*Hooker*, *Species Filicum*, v., p. 160. *Beddome*, *Ferns of British India*, t. 239.

G. (Eugymnogramme) Haughtoni—Eu-gym-nog-ram′-me ; Haugh′-ton-i (Haughton's), *Hooker*.

This species, native of St. Helena, is closely related to *G. cordata*, from which it differs principally in being more deeply cut and hardly at all scaly, its dark green pinnæ (leaflets) being scantily provided with scales on their under-surface only ; also in the nature of its sori (spore masses), which are oblong, thick, and at last fill up nearly the whole of the under-surface.—*Hooker*, *Second Century of Ferns*, t. 7.

G. (Selliguea) heterocarpa — Sel-li′-guĕ-a ; het-er-oc-ar′-pa (having variable fruit), *Blume.*

In this stove species, of medium dimensions, native of Java, the fronds, borne on firm, erect, naked stalks 6in. to 9in. long, are produced from a wide-creeping rhizome (stem) of a woody nature, densely covered with linear (long and narrow), brown scales ; they are simple (undivided), 6in. to 12in. long, 1in. to 2in. broad, very pointed at their summit, and very gradually narrowed at their lower part ; their texture is somewhat leathery and both surfaces are naked and glossy. The linear-oblong, immersed sori (spore masses), are disposed one between each main vein, and do not extend either to the edge or to the midrib.—*Hooker*, *Species Filicum*, v., p. 160.

G. (Eugymnogramme) hirsutula—Eu-gym-nog-ram′-me ; hir-su′-tul-a (slightly hairy), *Mettenius.*

A stove species, from New Granada, very closely related to *G. angustifrons* of Baker, from which it differs only in being of a less hairy nature and in its fronds not being enrolled at the point.—*Hooker*, *Synopsis Filicum*, p. 380.

G. (Eugymnogramme) hirta — Eu-gym-nog-ram′-me ; hir′-ta (hairy), *Desvaux.*

This stove species, native of Columbia, is of a peculiar aspect, on account of its pretty fronds, of an elongated-triangular shape and quadripinnatifid (four times divided half-way to the midrib), being borne on tufted stalks 6in. to 12in. long, dark chestnut-brown in colour, and slightly hairy. The leafy portion, 6in. to 12in. long and 4in. to 8in. broad, is of a firm, papery texture, the lower leaflets being triangular, and the whole of it is more or less hairy on both sides. The sori (spore masses), disposed one to each lobe, become confluent in the centre of the segments.—*Hooker*, *Species Filicum*, v., p. 133.

G. (Eugymnogramme) hispida — Eu-gym-nog-ram′-me ; his′-pid-a (hispid or hairy), *Mettenius.*

This greenhouse species, native of New Mexico and the Valley of the Rio Grande, and *G. triangularis*, are, according to Eaton, the only Gymnogrammes found in a wild state in North America—where *G. hispida* is also abundant along the San Pedro and the Gila, growing mostly on rocks. Its

fronds, deltoid and tripinnatifid (in shape of the Greek delta, Δ, and three times divided half-way to the midrib), are 2in. to 3in. each way; they are produced from a very slender, creeping rootstock, and are borne on stalks 4in. to 6in. long. The lower pair of leaflets, which are much the largest, are unequally triangular and cut down to the midrib; their closely-set upper segments are strap-shaped and blunt, and form peculiar, lobe-like wings along the rachis (stalk of the leafy portion) and midribs. The leaflets are hispid with straight, white, jointed hairs on their upper surface, and woolly beneath. The sori (spore masses), hidden by the tomentum (woolly substance), are disposed in long lines along the veinlets.—*Hooker*, *Synopsis Filicum*, p. 516. *Nicholson*, *Dictionary of Gardening*, ii., p. 104. *Eaton*, *Ferns of North America*, ii., t. 48.

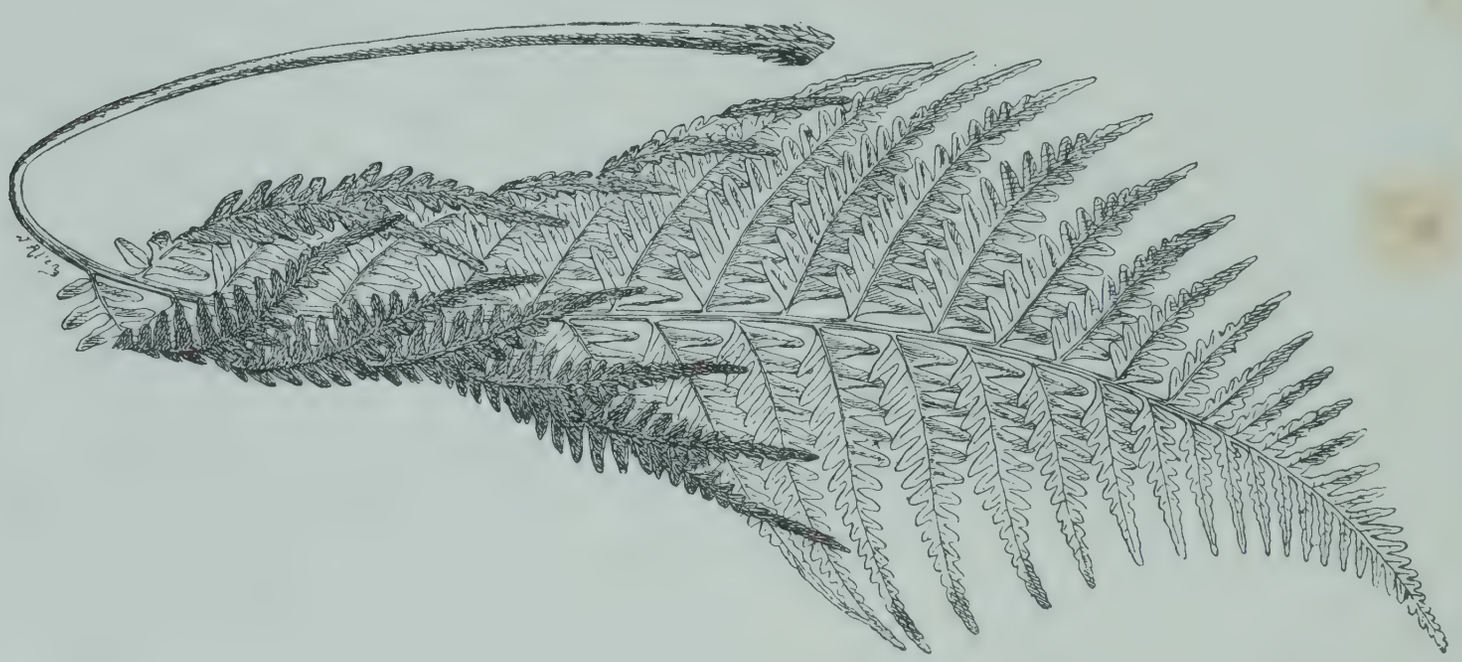


Fig. 62. Frond of Gymnogramme Hookeri
(⅓ nat. size).

G. (Eugymnogramme) Hookeri — Eu-gym-nog-ram′-me; Hook′-er-i (Hooker's), *J. Smith.*

This very distinct, stove species, native of the Andes of New Granada and Bolivia, has the habit of *G. tartarea ochracea*, but the yellow powder is replaced by a coating of a rusty-brown, woolly substance, which is not only observed on the under-part of the frond itself, but extends to the firm, dark chestnut-brown stalks, 4in. to 6in. long, on which they are borne. The fronds (Fig. 62) are 9in. to 15in. long, 4in. to 5in. broad, oblong-spear-shaped, and

bipinnate (twice divided to the midrib); the leaflets, spear-shaped and of a leathery texture, are cut down to the midrib into entire or slightly-toothed, narrow-oblong pinnules (leafits), ¼in. to ½in. long, with inrolled edges, and having about their own breadth between them. The lower surface is densely clothed with a woolly substance of the same nature and colour as that observed on the stalks. The oblong, thick sori (spore masses) at last cover the whole under-side of the fronds, where they are hidden under the tomentum (down). —*Hooker, Synopsis Filicum*, p. 381.

G. (Eugymnogramme) incisa—Eu-gym-nog-ram′-me; in-ci′-sa (incised or cleft), *Linden.*

A stove species, native of New Granada, with fronds 3in. to 4in. long, 1½in. broad, twice cut half-way to the midrib, and borne on wiry, ebeneous (blackish), slightly hairy stalks 3in. to 4in. long. The spear-shaped leaflets are cut down to a broadly-winged centre into oblong, entire (undivided) or forked lobes of a somewhat leathery texture, on which the narrow-oblong sori (spore masses) are disposed.—*Hooker, Species Filicum*, v., p. 134.

G. (Eugymnogramme) insignis — Eu-gym-nog-ram′-me; in-sig′-nis (remarkable), *Mettenius.*

In this stove species, native of Central Brazil, the rachis (stalk of the leafy portion of the fronds) is flexuose (bending to and fro). The fronds, produced from a short, densely-scaly rhizome (prostrate stem), and borne on short, chestnut-coloured stalks, are 1¼ft. long, 2in. to 3½in. broad, spear-shaped, and three or four times divided half-way to the midrib. The leaflets, distantly placed and also spear-shaped, are 3in. to 4in. long, reflexed, and distinctly stalked; their pinnules (leafits), also stalked, are usually reflexed and blunt, of a rigidly leathery texture, and with both surfaces hairy. The sori (spore masses) fall short of the edge.—*Hooker, Synopsis Filicum*, p. 516.

G. (Selliguea) involuta—Sel-li′-guĕ-a; in-vol-u′-ta (wrapped up, or rolled inwards), *Hooker.*

A stove species, native of Northern India, Ceylon, and the Solomon Islands, also of Southern India, and, according to Beddome, very abundant on the higher ranges of the Neilgherries and other mountains on the western side of the Madras Presidency, usually growing there on rocks and trunks of

trees. The plant has a creeping rhizome (prostrate stem), densely clothed with large, spear-shaped scales of a dull brown colour. The fronds are simple (undivided), 8in. to 12in. long, 1in. to 2in. broad, very pointed at their summit, but gradually narrowed towards the base to a short, broad, compressed stem. The texture, though leathery and thick, is flaccid; both surfaces are naked, and the sori (spore masses) are disposed in long, parallel, very oblique lines reaching from the midrib nearly to the edge.—*Hooker*, *Species Filicum*, v., p. 155. *Beddome*, *Ferns of Southern India*, t. 50.

G. (Selliguea) japonica — Sel-li′-guĕ-a ; jap-on′-ic-a (from Japan), *Desvaux*.

This interesting and highly decorative, greenhouse species, usually known under the name of *Dictyogramme japonica*, is, as its name implies, a native of Japan, though hardly distinct in general appearance from *G. javanica*. Its fronds, 1½ft. to 2ft. long and 1ft. broad, are produced from a stout, fleshy, underground, creeping rhizome (stem), and borne on stout, fleshy stalks of quite upright habit and chestnut-brown colour; they are simply pinnate (once divided to the midrib) or sometimes twice pinnate at the base, and their leaflets, 6in. to 12in. long, 1in. to 2in. broad, narrow-oblong, entire (undivided), and pointed at their extremity, are of a very dark green colour. The sori (spore masses), usually disposed on all the veins, extend from the midrib to the edge.—*Hooker*, *Species Filicum*, v., p. 151. *Nicholson*, *Dictionary of Gardening*, ii., p. 105.

When first introduced, this very useful species was expected to become a good evergreen Fern for outdoor culture. In that respect, at least, it has not answered our expectations, as it will only bear a few degrees of frost, and can hardly be called an evergreen, as the old fronds, although dying down gradually, have all disappeared by the time the new ones make their appearance. The general aspect of the plant is that of a broad-leaved *Pteris cretica* of a very dark colour and stiff habit. It is a great lover of moisture, and to do well requires a quantity of water at the roots all the year round. The soil which suits it best is a mixture of about equal quantities of peat and fibrous loam. The plant has a great antipathy to being potted hard, and particularly dislikes water on the fronds, which turn black in a very short time if subjected to frequent syringings.

Lygodium japonicum

(⅓ nat. size).

G. j. tessellata—tes-sel-la′-ta (tessellated), *Williams.*

A pretty and totally distinct variety, differing from the species through its foliage being of a much thinner texture than in the type, and of a mottled yellowish tint, produced by the transparency of the veins, which are reticulated and beautifully shown when the plant is fertile.

G. (Eugymnogramme) javanica—Eu-gym-nog-ram′-me ; ja-van′-ic-a (Javanese), *Blume.*

This stove species, native of the Sandwich, Fiji, and Malayan Islands, also of Japan and Northern India, where it grows at an altitude of 8000ft., is, in general appearance, very similar to the foregoing species ; but, besides being of a more elegant habit, it is also of much larger dimensions, for its fronds, which, like those of *G. japonica*, are pinnate or bipinnate, and produced from a thick, underground, creeping rhizome (stem), are 1ft. to 4ft. long, and borne on stalks of similar length and of a flexible nature. The leaflets, oblong-spear-shaped, 3in. to 12in. long, and 1in. to 3in. broad, are sessile (stalkless) or slightly stalked (Fig. 63), acuminate (terminating in a sharp point) at the apex, and with their edge sometimes smooth, sometimes finely toothed ; they are of a firm, papery texture, and glossy on both sides, though sometimes slightly hairy underneath. The sori (spore masses) are disposed on the veins and run along all of them, but stop a space short of the edge.—*Hooker*, *Species Filicum*, v., p. 145. *Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Beddome*, *Ferns of British India*, t. 57.

Fig. 63. Gymnogramme javanica (much reduced).

G. lanata—la-na′-ta (woolly). A variety of *G. ferruginea.*

G. (Selliguea) lanceolata—Sel-li′-guĕ-a ; lan-cĕ-ol-a′-ta (lanceolate or spear-shaped), *Hooker.*

This species, which succeeds equally well under either cool or warm treatment, is a native of Japan, China, Ceylon, the Fiji, Samoan, and Mascarene Islands, Natal, the Himalayas, and the Neilgherries, where, according to Beddome, it usually grows on trees. Its simple (undivided) fronds, 6in. to 12in. long and ½in. to ¾in. broad, are sharply pointed at their summit, whereas their lower third is gradually narrowed to the base or to a short stalk ; they are produced from a wide-creeping rhizome (prostrate stem) covered with small, very narrow scales of a dull brown colour, are of a thick, leathery, yet flaccid texture, and smooth on both sides. The sori (spore masses) are disposed in oblique lines, starting from the midrib, but falling considerably short of the edge. Fig. 64 is reduced from Col. Beddome's "Ferns of Southern India," by the kind permission of the author.—*Hooker*, *Species Filicum*, v., p. 156. *Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Beddome*, *Ferns of Southern India*, t. 51.

Fig. 64. Gymnogramme lanceolata (¼ nat. size).

G. Lathamiæ—La-tham′-ĭ-æ (Mrs. Latham's), *Latham.*

A very handsome Fern, of garden origin, raised by Mr. W. B. Latham, Curator of the Botanic Gardens, Birmingham, and supposed to be a hybrid between *G. decomposita* and the West Indian *G. schizophylla.* Its general aspect fully warrants the supposition, for while its fronds are as finely divided as those of the latter species they are as broad as those of the former, being 2ft. to 2½ft. long, and quadripinnate (four times divided to the midrib) ; their leaflets, triangular in shape, are ascending and very short-stalked, pale green on their upper surface, but whitish underneath. The habit is also intermediate between the two species named, *G. Lathamiæ* being much more upright than *G. schizophylla*, while its chestnut-red stalks are slenderer than those of *G. decomposita.*—*Nicholson*, *Dictionary of Gardening*, ii., p. 105.

G. Laucheana — Lauch-ĕ-a′-na (Lauche's). This and its various forms are all varieties of *G. calomelanos chrysophylla.*

G. (Eugymnogramme) Lechleri—Eu-gym-nog-ram′-me ; Lech-le′-ri (Lechler's), *Mettenius.*

A stove species, of small dimensions, native of Peru, with sharp-pointed, spear-shaped fronds 1ft. long, 3in. broad, and three or four times divided half-way to the midrib. The rachis (stalk of the leafy portion) is straight and densely clothed with bristly hairs. The leaflets are stalked as well as their leafits, which are oblong or egg-shaped and blunt. Both surfaces are shortly hairy, and the sori (spore masses) are disposed at the base of the final lobes.—*Hooker, Synopsis Filicum*, p. 516.

G. (Eugymnogramme) leptophylla—Eu-gym-nog-ram′-me ; lep-toph-yl′-la (slender-leaved), *Desvaux.*

This small-growing species, which widely differs from nearly all the other species of Ferns in being an annual, possesses an uncommon and nearly unlimited range of habitat. From Hooker we learn that, besides being a native of many parts of Europe, it is also found wild in Abyssinia, Cape Colony, Persia, the Neilgherries, New South Wales, Tasmania, New Zealand, the Andes of Mexico, and Ecuador. Beddome also states that it is abundant on the Neilgherries and Mahableshwar Hills, Sattara Fort walls (Bombay Presidency), that it has also been collected between Ootacamund and Kotagherry, and that in these localities it only appears during the rainy season. From Lowe we learn that *G. leptophylla*, the "Annual Maidenhair," is indigenous in the warmer parts of Europe, that it is found in France, Brittany, Provence, Italy, Naples, Sicily, Germany, Spain, the Canaries, the Azores, and Jersey. Lowe significantly adds, "the interest in this little plant is increased from the circumstance that it is the solitary British representative of this interesting genus."

Although it had long been known as a native of the Southern Continent of Europe, its adjacent islands, and Madeira, *G. leptophylla* was not until 1852 included among the British Flora. The first information that we possess of its being a native of the British Islands dates from that year, when Mr. N. B. Ward found it growing wild in various localities in Jersey, besides near St. Aubyn's and St. Lawrence, "where it was growing on moist

banks with a southern aspect, and where the Marchantia (Liverwort) flourishes."

The barren and fertile fronds are totally dissimilar, the former being only half the length of the latter, which usually measure from 2in. to 4in. in length and 1in. to 1½in. in breadth. The barren ones are ovate (egg-shaped) or deltoid (in shape of the Greek delta, Δ), divided into cuneate-flabellate (wedge-fan-shaped) segments, cut from the circumference to the centre into linear (very narrow) or oblong lobes of a thin, papery texture, smooth on both surfaces, and usually rest on the ground. The fertile fronds, of erect habit, loosely bi- or tripinnate (twice or three times divided to the midrib), have nearly the whole of their under-surface covered with the sori (spore masses), which are disposed one on each ultimate segment of the veins. Both kinds of fronds are borne on tufted, slender, glossy stalks 1in. to 4in. long and of a chestnut-brown colour. They are produced from a small crown, which completely dies away when they fall ; at that time it is advisable to keep the surrounding soil constantly moist, to induce the germination of the spores which may have fallen around it. In this way *G. leptophylla* is generally kept from year to year ; but it is safer to gather some spores specially for the ensuing season's crop of young plants, which attain their full development in the course of a few weeks. Fig. 65 is reduced from Col. Beddome's "Ferns of Southern India," by kind permission of the author.—*Hooker*, *Species Filicum*, v., p. 136. *Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Beddome*, *Ferns of Southern India*, t. 270. *Lowe*, *Ferns British and Exotic*, i., t. 7.

Fig. 65. Gymnogramme leptophylla (½ nat. size).

Although generally considered fairly hardy, the "Slender-leaved Gymnogramme" thrives best in the warm house, where one frequently finds seedlings coming up spontaneously on the surface of the pots containing other plants. A warm, shady, moist nook in the Fernery is therefore the most suitable

situation. The compost which this species prefers is one made of equal parts of leaf-mould, peat, and loam, with a little sand. It also requires, while growing, an abundant supply of water at the roots, but must have thoroughly good drainage.

G. L'Herminieri—L'Her-min-ĭ-e′-ri (L'Herminier's). This is a form of *G. calomelanos chrysophylla.*

G. (Syngramme) Lobbiana—Syn-gram′-me ; Lob-bĭ-a′-na (Lobb's), *Hooker.*

A stove species, of small dimensions, native of Borneo. Its simple (undivided) fronds, of a leathery texture, and borne on tufted, glossy stalks 2in. to 3in. long, are from 6in. to 10in. long, ½in. to ¾in. broad, linear-oblong (boat-shaped), pointed at their extremity, and narrowed or slightly rounded at the base ; they are smooth on both sides, and the linear-oblong sori (spore masses) are disposed from the midvein to within a short distance of the edge.—*Hooker, Species Filicum*, v., p. 153, t. 300.

G. Lowei—Low′-ĕ-i (Lowe's). Synonymous with *G. Totta.*

G. (Selliguea) macrophylla—Sel-lĭ′-guĕ-a ; mac-roph-yl′-la (large-leaved), *Hooker.*

A stove species, native of the Malayan and Philippine Islands and New Guinea. Its simple (undivided) fronds are 1ft. to 1½ft. long, 3in. to 4in. broad, and gradually narrowed to both ends ; they have their edge smooth, are borne on stout, naked stalks 2in. to 6in. long, and produced from a creeping rhizome (stem) covered with spear-shaped scales of a dull brown colour. The sori (spore masses) are disposed in single, continuous or slightly interrupted rows between the main veins.—*Hooker, Species Filicum*, v., p. 159. *Nicholson, Dictionary of Gardening*, ii., p. 105.

G. (Selliguea) Maingayi—Sel-lĭ′-guĕ-a ; Main-gay′-i (Maingay's), *Baker.*

A very distinct, stove species, native of Malacca, with fronds less than 1ft. long, triangular, and furnished with five oblong-spear-shaped leaflets, the end one the longest, gradually narrowed at the base ; they are borne on naked stalks 1½ft. long and of a dull brown colour, and the very copious, minute, irregular sori (spore masses) are dotted or confluent in lines or curves.—*Hooker, Synopsis Filicum*, p. 517.

G. (Eugymnogramme) marginata—Eu-gym-nog-ram′-me ; mar-gin-a′-ta (bordered), *Mettenius.*

This is a distinct, stove species, native of New Caledonia, and one of the few members of the genus having simple (undivided) fronds. These fronds are long-oblong, 8in. to 16in. long, ¾in. to 1¼in. broad, narrowed gradually towards both ends at the base into a short stalk, with their edge slightly bowed, showing a tendency to become sinuate (wavy) ; they are of a leathery texture and have both surfaces naked. The sori (spore masses) are linear (long and narrow).—*Hooker, Species Filicum*, v., p. 127.

G. Martensii — Mar-tens′-ĭ-i (Martens's). A form of *G. calomelanos chrysophylla.*

G. Massoni—Mas-so′-ni (Masson's). A form of *G. calomelanos chrysophylla.*

G. (Eugymnogramme) Matthewsii — Eu-gym-nog-ram′-me ; Mat-thews′-ĭ-i (Matthews's), *Hooker.*

A stove species, of medium dimensions, native of Peru. Its fronds are tri-pinnatifid (three times divided half-way to the midrib), 1ft. to 1¼ft. long, 4in. to 5in. broad, oblong-spear-shaped, and borne on stalks 4in. to 6in. long, of a dark chestnut-brown colour and clothed with dense, brown, deciduous hairs. The leaflets, 2in. long and 1in. broad, are cut down to the midrib below into oblong, blunt leafits, with broad, rounded lobes of a leathery texture and hairy on both sides. The sori (spore masses) are of a conspicuous brown colour.—*Hooker, Species Filicum*, v., p. 128, t. 290.

G. Mayii—May′-ĭ-i (May's). A sub-variety of *G. calomelanos peruviana.*

G. (Selliguea) mexicana—Sel-li′-guĕ-a ; mex-ic-a′-na (Mexican), *Baker.*

A stove species, native of Mexico and Guatemala, with simple (undivided) fronds, produced from a wide-creeping rhizome (prostrate stem), clothed with large, spear-shaped scales of a dull brown colour. These fronds, of a leathery but flaccid texture, are sub-sessile (almost stalkless), 6in. to 10in. long, 1in. to 1¼in. broad, and sharp-pointed at their summit, but gradually narrowed to the base. They are naked on both sides, and the few narrow-oblong sori, which are not closely set, are disposed almost in one row on each side of and not far from the midrib.—*Hooker, Species Filicum*, v., p. 157.

G. (Eugymnogramme) microphylla—Eu-gym-nog-ram′-me ; mi-croph-yl′-la (small-leaved), *Hooker.*

A very pretty and distinct, greenhouse species, of small dimensions—indeed one of the smallest of the whole genus—native of the Khasya Hills. Notwithstanding their small size, its triangular fronds, borne on densely-tufted, slender, fragile stalks 2in. to 4in. long and of a chestnut-brown colour, are very finely divided, being quadri-pinnatifid (four times divided half-way to the midrib). Their leaflets, also triangular, are closely set and are further cut into pinnules (leafits) of similar shape, their ultimate divisions being very small. The texture is thin and papery, and the oblong sori (spore masses) are disposed one on each of the ultimate divisions. Fig. 66 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker, Species Filicum*, v., p. 129 ; *Second Century of Ferns*, t. 15. *Beddome, Ferns of British India*, t. 148.

Fig. 66. Gymnogramme microphylla (½ nat. size).

G. (Eugymnogramme) mohriæformis—Eu-gym-nog-ram′-me ; moh-rĭ-æ-for′-mis (Mohria-shaped), *Mettenius.*

Another stove species, of small dimensions, native of Peru, and essentially distinct through the elongated-triangular shape of its fronds, which are seldom more than 3in. long, 1in. broad, and bipinnate (twice divided to the midrib) ; they are borne on tufted, wiry stalks 3in. to 4in. long, of a peculiar dark purplish-brown colour, and slightly hairy. The lower leaflets, which are the largest, measure about ½in. long by ¼in. broad, and are cut down nearly or quite to the rachis into roundish, notched, leathery lobes. The sori are small and oblong.—*Hooker, Species Filicum*, v., p. 128.

G. (Eugymnogramme) Muelleri—Eu-gym-nog-ram′-me ; Muel′-ler-i (Baron von Mueller's), *Hooker.*

This singular and interesting species, which succeeds equally well under either cool or warm treatment, is a native of North-East Australia and

Queensland. When in a young state it has all the appearance of the common *Asplenium Ceterach* (*Ceterach officinarum*), the upper surface of its fronds being dotted all over with white. It is, however, a totally different plant when fully developed, for its fronds, which are borne on wiry stalks 3in. to 4in. long, densely clothed with small, rusty-brown scales, are only once divided to the midrib (Fig. 67), 4in. to 10in. long and 1in. to 3½in. broad. The leaflets are sessile (stalkless), roundish or oblong, sometimes 1½in. long

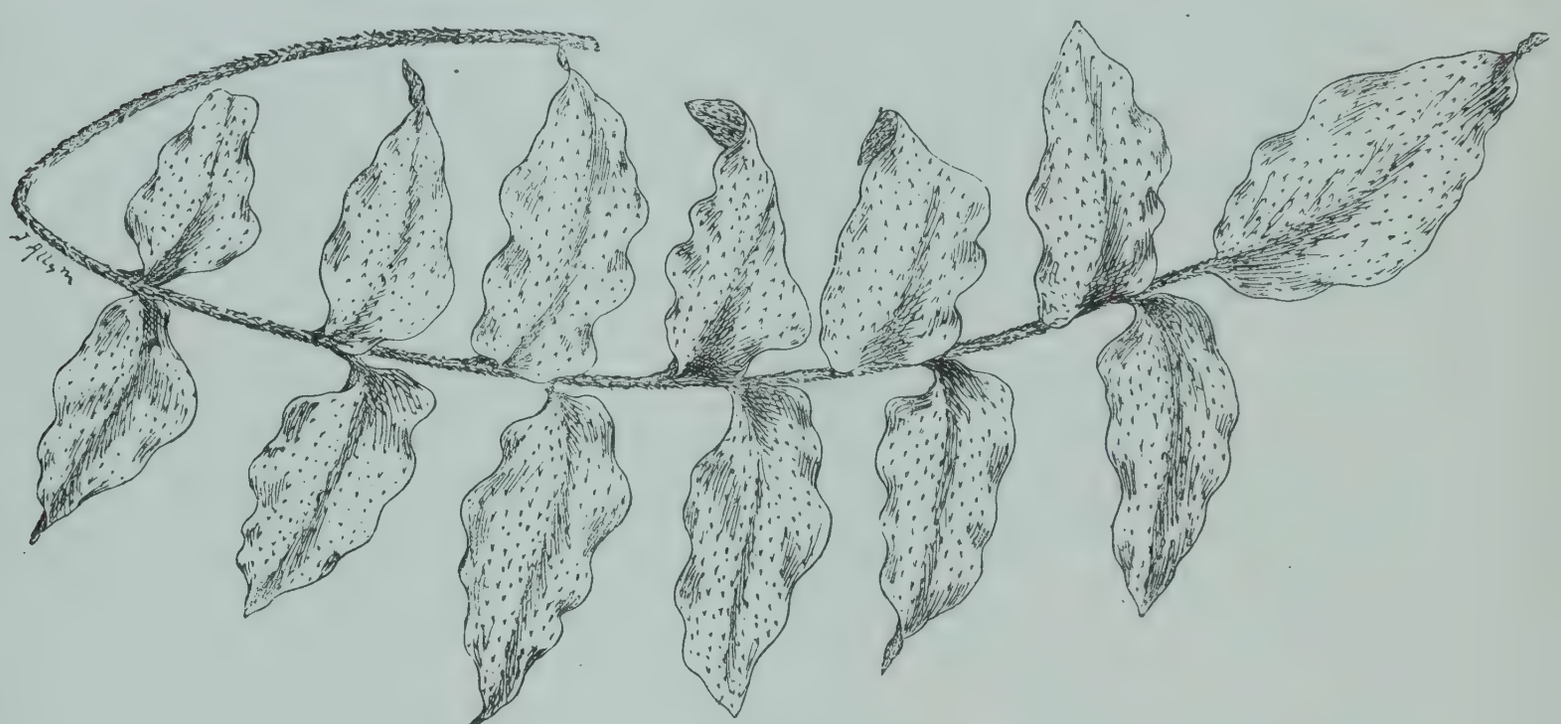


Fig. 67. Frond of Gymnogramme Muelleri (nat. size).

and ½in. broad, entire (undivided), the lower ones being frequently eared. The texture is thick and leathery, and the under-surface is densely matted with brownish scales. The abundant sori (spore masses) are narrow, disposed in several rows nearer the edge than the midrib, and eventually become confluent —*Hooker*, *Species Filicum*, v., p. 143, t. 295.

G. (Eugymnogramme) myriophylla—Eu-gym-nog-ram′-me ; my-rĭ-oph-yl′-la (myriad-leaved), *Swartz.*

A distinct, stove species, native of Peru. Its oblong-spear-shaped fronds, 1ft. to 1½ft. long and 4in. to 6in. broad, are borne on stalks 6in. to 12in. long and more or less densely covered with reddish-brown scales, and are

tri-pinnatifid (three times divided half-way to the midrib), their spear-shaped leaflets, 2in. to 3in. long and 1in. broad, being again divided into pinnules (leafits) similarly spear-shaped and cut down again into roundish or oblong segments of a thin, papery texture. The numerous oblong sori (spore masses) become confluent in the centre of the segments.—*Hooker*, *Species Filicum*, v., p. 134.

G. (Syngramme) obtusifolia—Syn-gram′-me ; ob-tu-sif-ol′-ĭ-a (blunt-leaved), *Hooker.*

A stove species, of medium dimensions, native of Java, with simple, (undivided) strap-shaped fronds 6in. to 9in. long, ¼in. to ½in. broad, blunt at the point, and very gradually narrowed at their lower part to a greenish, naked stalk 2in. to 3in. long proceeding from a creeping rhizome (prostrate stem) ; they are of a leathery texture, smooth on both sides, and the narrow-oblong sori (spore masses) are disposed near the midvein.—*Hooker*, *Species Filicum*, v., p. 153, t. 299.

G. ochracea—o-chra′-cĕ-a (ochre-coloured). A variety of *G. tartarea.*

G. (Leptogramme) opaca—Lep-tog-ram′-me ; op-a′-ca (opaque), *Sprengel.*

A very strong-growing, stove species, native of Java, Northern India, Nepaul, and Khasya. Its fronds are several feet long, often 2ft. broad, and borne on strong, glossy stalks 1½ft. to 2ft. long. The lower leaflets, often 1ft. long and 6in. broad, are divided into spear-shaped, closely-set pinnules (leafits), which are cut down nearly to the rachis (stalk of the leafy portion) below into close, oblong, slightly-toothed lobes of a soft, papery texture, and naked on both sides. The oblong and irregular sori (spore masses) are disposed close to the midrib.—*Hooker*, *Species Filicum*, v., p. 143. *Beddome*, *Ferns of British India*, t. 238.

G. (Eugymnogramme) Ottonis — Eu-gym-nog-ram′-me ; Ot-to′-nis (Otto's), *Klotzsch.*

This is a small-growing, stove species, native of Venezuela. Its bipinnate (twice-divided) fronds seldom exceed 1ft. in length, including their glossy, wiry, ebeneous (blackish) stalks. The leaflets are of a somewhat leathery texture, and divided into nearly round, entire or slightly-cleft, naked

leafits. The sori (spore masses) consist of only a few capsules, scattered irregularly on the veins underneath.—*Hooker*, *Species Filicum*, v., p. 128.

G. (Selliguea) palmata—Sel-li′-guĕ-a ; pal-ma′-ta (palmate), *Baker*.

A stove species, as curious as it is distinct, native of San Cristobal and the Solomon Islands. Its singular fronds, borne on naked, ebeneous (blackish), polished stalks 6in. to 9in. long, are from 6in. to 9in. each way, and cut down nearly to the base into five divisions, the central one being 4in. to 6in. long, 1in. to 1½in. broad, oblong-spear-shaped, and slightly undulated ; the other divisions, although of similar shape, are shorter and often unequal-sided. The texture is thin and papery, and both the surfaces are nearly naked. The fine, irregular sori (spore masses) are abundantly disposed on the cross-veinlets, which unite the main veins on the under-surface.—*Hooker*, *Synopsis Filicum*, p. 389.

Fig. 68. Pinna of Gymnogramme Pearcei
(nat. size).

G. Parsonsii — Par-son′-sĭ-i (Parsons's). A form of *G. calomelanos chrysophylla*.

G. (Eugymnogramme) Pearcei — Eu-gym-nog-ram′-me ; Pear′-cĕ-i (Pearce's), *Moore*.

This is an exceedingly elegant, stove species, native of Peru, whence it was introduced in 1864 ; but, unfortunately, it has become very scarce in

collections. Its beautiful fronds, deltoid and quadripinnatifid (in shape of the Greek delta, Δ, and four times divided half-way to the midrib), are borne on glossy stalks 6in. to 9in. long and of a bright chestnut-brown colour; they are about 1ft. each way, their lower leaflets, which are the largest, being about 6in. long and again divided into overlapping pinnules (leafits), which, in their turn, are cut into simple or forked segments (Fig. 68). These fronds are of a thin, papery texture, and of a dark shining green above, while their under-side is slightly dusted with white farinose powder, which extends along the stalks and to the crown of the root. The sori (spore masses) are disposed one to each ultimate segment. *G. Pearcei* is a gem among the genus.—*Hooker*, *Synopsis Filicum*, p. 384. *Nicholson*, *Dictionary of Gardening*, ii., p. 105.

G. P. robusta—ro-bus′-ta (stout, strong), *Moore.*

Like the original species, from which it is an accidental seedling, this variety has somewhat deltoid fronds of a dark green colour and very finely cut, but narrower at the base and more elongated towards the summit: in other respects it is larger in all its parts. The lower portion of the stalks and the crown itself are covered with white powder. Unlike most Gymnogrammes, which have but a single crown, this variety forms a tuft of crowns at the apex of the short stem, from which many stalks arise, giving the plant a denser habit and the appearance of being better furnished than the original type. Though this plant has been in cultivation for many years, it has never been known to produce spores.—*Nicholson*, *Dictionary of Gardening*, iv., p. 550.

G. (Eugymnogramme) pedata—Eu-gym-nog-ram′-me; ped-a′-ta (footed, having feet), *Kaulfuss.*

A very distinct, stove species, easily distinguished by its pedate habit, native of Mexico and Guatemala. Its fronds, produced from a creeping rhizome (prostrate stem), and borne on fragile, glossy, chestnut-brown stalks 6in. to 12in. long, are 4in. to 6in. each way. The lower leaflets are much the largest; the upper ones are spear-shaped, with narrow-oblong, entire or slightly-toothed lobes of a thin, papery texture; both surfaces are slightly hairy, especially on the midrib. The sori (spore masses), which are confluent, form a conspicuous band just inside the margin.—*Hooker*, *Species Filicum*, v., p. 131.

G. peruviana—per-u-vĭ-a′-na (Peruvian). A variety of *G. calomelanos.*

G. (Leptogramme) pilosa—Lep-tog-ram′-me ; pil-o′-sa (hairy), *Martius and Galeotti.*

A doubtful plant, of small dimensions, native of Mexico. Perhaps it may be a small slender form of *G. diplazioides*, more hairy than usual.—*Hooker*, *Species Filicum*, v., p. 141.

G. (Selliguea) pinnata—Sel-li′-guĕ-a ; pin-na′-ta (pinnate), *Hooker.*

A stove species, native of Fiji, Queensland, and the Malayan Islands, with fronds 1ft. or more long, nearly as broad, and simply pinnate (only once divided to the midrib). The firm, upright, and glossy stalks are from 6in. to 12in. long, and the leaflets, 6in. to 9in. long and ½in. to 1in. broad, are gradually narrowed to both ends, and have their edge nearly entire ; they are of a leathery texture, naked on both sides. The oblong or linear (narrow), irregular spore masses are often confluent.—*Hooker*, *Species Filicum*, v., p. 151.

G. (Leptogramme) polypodioides — Lep-tog-ram′-me ; pol-yp-od-ĭ-ŏ-i′-dēs (Polypodium-like), *Sprengel.*

This stove species, native of Brazil, is a robust grower, producing from a creeping rhizome (prostrate stem) fronds 1ft. long, 6in. to 9in. broad, and bipinnatifid (twice divided half-way to the midrib). These are borne on firm, glossy, naked stalks 6in. to 9in. long, and are furnished with spear-shaped leaflets cut two-thirds of the way down into sickle-shaped lobes provided with a wing at the base. These lobes are of a soft, papery texture, naked on both sides, and the narrow-oblong sori (spore masses) are disposed down the centre of each lobe.—*Hooker*, *Species Filicum*, v., p. 140.

G. (Ceropteris) pulchella—Ce-rop′-ter-is ; pul-chel′-la (fair), *Linden.*

A very handsome, stove species, native of Venezuela, and one which comes very near *G. calomelanos peruviana*, from which, however, it is readily distinguished by its more upright habit and by the shape of its fronds, which are borne on firm stalks 6in. to 9in. long, of a dark chestnut-brown colour and silvery. The leafy portion of the frond is 6in. to 12in. long, 4in. to 6in. broad, oblong-triangular and tripinnatifid (three times divided half-way to the midrib). The lower leaflets are the largest, and have their

pinnules (leafits) overlapping; they are of a soft texture, deep green and slightly powdered above, and very densely covered beneath with silvery-white farina. The sori (spore masses) are deeply immersed in the farinose powder. —*Hooker, Filices Exoticæ*, t. 74. *Nicholson, Dictionary of Gardening*, ii., p. 105. *Lowe, New and Rare Ferns*, t. 5.

G. p. Wettenhalliana—Wet-ten-hal-lĭ-a′-na (Wettenhall's), *Moore.*

This useful and highly decorative variety, of garden origin, differs from the foregoing species mainly in the crested form of its fronds, which are of smaller dimensions than those of *G. pulchella*, but otherwise very similar

Fig. 69. Frond of Gymnogramme pulchella Wettenhalliana
(much reduced).

in division (Fig. 69). In good varieties the fronds, which have their extremities ornamented by a large corymb, bear also dense crests at the points of all their leaflets. The leafy portion is rather contracted, and the whole plant, which is naturally of a stiff habit, is copiously covered with a pale sulphur-coloured powder. This variety does not reproduce itself true from spores.—*Hooker, Synopsis Filicum*, p. 385.

G. (Eugymnogramme) pumila — Eu-gym-nog-ram′-me ; pu′-mil-a (small), *Sprengel.*

A stove species, of very small dimensions, native of the West Indies and Guatemala, and thoroughly distinct through its little simple (undivided)

fronds being palmately forked at their summit; their upper surface is of a peculiar dark green colour and glossy, and their spore masses are linear (narrow) and irregular.—*Hooker*, *Species Filicum*, v., p. 126.

G. (Eugymnogramme) reniformis — Eu-gym-nog-ram′-me; re-nif-or′-mis (kidney-shaped), *Martius*.

This is a most singular-looking, stove species, native of Brazil and Peru, and deserving of notice on account of its leathery fronds, which are 1in. to 1½in. each way, and have their outer edge round and faintly notched; they are borne on wiry, blackish stalks 1in. to 2in. long. The simple, linear sori (long and narrow spore masses) at last form a broad line parallel with the outer edge and about ⅛in. within it.—*Hooker*, *Species Filicum*, v., p. 126; *Second Century of Ferns*, t. 9.

G. (Eugymnogramme) rufa — Eu-gym-nog-ram′-me; ru′-fa (reddish), *Desvaux*.

A distinct and ornamental, stove species, native of Mexico and the West Indies. Its fronds are 1ft. to 1½ft. long, 3in. to 5in. broad, and simply pinnate (only once divided to the midrib); they are borne on upright, firm, chestnut-brown stalks 4in. to 12in. long, clothed with soft, spreading hairs, and furnished with stalked leaflets that are rounded or heart-shaped at the base, bluntish at their extremity, 1in. to 2½in. long, ½in. to 1in. broad, and smooth on the edge. These leaflets are of a soft, papery texture, and are thickly covered, especially underneath, with reddish-brown hairs. The abundant narrow sori (spore masses) are disposed on the veins all over the under-surface, and in the more mature state become confluent on every leaflet.—*Hooker*, *Species Filicum*, v., p. 145. *Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Lowe*, *Ferns British and Exotic*, i., t. 6A.

G. (Eugymnogramme) rutæfolia—Eu-gym-nog-ram′-me; ru-tæ-fol′-ĭ-a (Rue-leaved), *Hooker and Greville*.

A curious, dwarf-growing, greenhouse species, having somewhat the appearance of our British *Asplenium Ruta-muraria*, with hairy and simply-pinnate fronds, 2in. to 3in. long, their leaflets being fan-shaped on the outside, and lobed and wedge-shaped at the base.—*Lowe*, *New and Rare Ferns*, t. 45A.

G. (Eugymnogramme) schizophylla—Eu-gym-nog-ram′-me ; schiz-oph-yl′-la (cut-leaved), *Moore.*

This is a very distinct, stove species, native of Jamaica, and its elegant contour, moderate size, and graceful habit, coupled with the delicate cutting of the leaflets and their pleasing colour, render it one of the most attractive of Ferns. The fronds, which are freely produced from a central crown, are borne on slender stalks of a reddish-brown hue ; they average about 2ft. in length and 6in. broad, and are elegantly arched on all sides (Fig. 70), which habit makes this one of the very best Ferns for growing in suspended baskets. The ultimate segments are very small, and their slightly-powdered under-surface is covered with the spore masses, which are disposed one row to each segment.—*Nicholson*, *Dictionary of Gardening*, ii., p. 105.

Fig. 70. Gymnogramme schizophylla (much reduced)

A very remarkable peculiarity in this species consists in the forking of the stalk at about two-thirds of its length in the leafy portion, where it produces a young plant. These little plants may be used for propagation, as they root very freely when pegged down on a mixture of peat, chopped sphagnum, and sand, in about equal proportions.

G. s. gloriosa—glo-rĭ-o′-sa (glorious), *Linden.*

A beautiful garden form of the above, with fronds of much larger dimensions and of a peculiarly feathery nature, raised in France by Mr. Ch. Maron in 1881, and distributed in 1883 by Linden as one of his introductions. It is also of much more robust constitution, and reproduces itself true from spores, which are produced abundantly, and also from young plants, which are found growing not only at the extremity of the fronds, but even at the end of each leaflet.—*Nicholson*, *Dictionary of Gardening*, ii., p. 105.

G. (Eugymnogramme) Schomburgkiana—Eu-gym-nog-ram′-me ; Schom-burgk-ĭ-a′-na (Dr. Schomburgk's), *Kunze.*

A stove species, native of British Guiana, with fronds 2in. to 5in. long, 1½in. broad, tripinnatifid (three times divided half-way to the midrib), and borne on naked, glossy stalks 6in. to 9in. long, of a dark chestnut-brown colour. The lower leaflets are triangular, and cut down to the midrib into spathulate pinnules (spoon-shaped leafits) of a somewhat leathery texture. The sori (spore masses) are irregularly disposed along the veins.—*Hooker*, *Species Filicum*, v., p. 127 ; *Second Century of Ferns*, t. 92.

G. Steltzneri—Steltz′-ner-i (Steltzner's). A variety of *G. tartarea.*

G. (Ceropteris) sulphurea — Ce-rop′-ter-is ; sul-phur′-ĕ-a (sulphur-coloured), *Desvaux.*

This exquisitely beautiful, stove species, native of the West Indies, is about the smallest-growing of all the Golden Gymnogrammes with spear-shaped fronds. The form of its fronds, which are 6in. to 12in. long and 3in. to 4in. broad, is extremely elegant, the leaflets being in pairs and set rather widely apart ; those nearest the base of the frond are smallest and of a triangular shape, and they gradually become larger and more elongated as they become farther removed from the crown from which they are produced, attaining their greatest length in the centre of the fronds. The stalks are 1in. to 6in. long, but generally short, slender, of a chestnut-brown colour, and often powdery. The pinnules (leafits) are fan-shaped, with entire (undivided) or cleft, wedge-shaped segments of a soft, papery texture, pale green above, and profusely covered beneath with a brilliant sulphur-yellow, farinose powder, of which there is also an occasional sprinkling on the upper surface. The narrow, obliquely-forked sori (spore masses) become, when fully mature, confluent and nearly cover the whole under-surface of the frond.—*Hooker*, *Species Filicum*, v., p. 147. *Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Lowe*, *Ferns British and Exotic*, i., t. 5.

G. sulphurea is easily distinguished by its cutting, its small size, and the soft texture of its fronds, narrowed in the lower third. Unfortunately, it is more difficult than other Gymnogrammes to grow from one year to another. During the winter it must be kept as close to the light as possible.

Davallia pallida
(1/6 nat. size).

G. (Ceropteris) tartarea—Ce-rop′-ter-is ; tar-tar′-ĕ-a (strong), *Desvaux*.

A very distinct and deservedly-popular, stove species, also known in gardens as *G. dealbata*, native of Tropical America. Its fronds are oblong-triangular, 1ft. to 2ft. long, 6in. to 12in. broad, and borne on firm stalks 6in. to 12in. long, of a dark chestnut-brown colour, and scaly towards the base. They are twice divided nearly (not quite, as appears to be the case in Fig. 71) to the midrib ; of the numerous spear-shaped leaflets, the lowest are the largest (Fig. 71), and all are divided into oblong, blunt leafits, entire or nearly so, of a heavy, dull green colour on their upper surface, but entirely covered beneath with a coating of pure snowy-white, farinose powder. The abundant narrow spore masses are disposed along the midvein, eventually becoming confluent ; and being of a very dark colour, as well as the stalks, form a striking contrast with the pure white under-side of the fronds. — *Hooker, Species Filicum*, v., p. 148. *Nicholson, Dictionary of Gardening*, ii., p. 105. *Lowe, Ferns British and Exotic*, i., t. 3.

Fig. 71. Gymnogramme tartarea (much reduced).

According to Baker, this species is very variable, and several Ferns which are usually considered as distinct species, on account of the golden colour of their under-side or of some other distinctive character, are by him retained as only varietal forms of *G. tartarea ;* such are the following :

G. t. ochracea—o-chra′-cĕ-a (yellow), *Presl.*

This differs essentially from the species to which it is held to be related through the bright yellow colour of the under-side of its fronds, which have pinnules (leafits) very regular and only the lowest distinctly toothed. It is

probably the most accommodating of all the Golden Gymnogrammes as regards temperature, as it makes itself at home equally in a good greenhouse or in a stove. Its fronds, also, are produced in greater abundance than those of most other Gymnogrammes, and are of a bright-shining green above, which forms a very pleasing contrast with the yellow colour of their under-side. It is a native of Peru.—*Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Lowe*, *Ferns British and Exotic*, i., t. 4.

G. t. Steltzneri—Steltz′-ner-i (Steltzner's), *Koch.*

In this variety the fronds are more elongated, frequently 2ft. long, and flaccid ; the leaflets, which are set a little distance apart, are narrow-spear-shaped, and their under-side is thinly covered with a coating of dark yellow powder. The extremity of the frond and that of the leaflets are frequently, though not regularly, forked or even slightly crested. The most distinctive character, however, resides in the nature of the stalk and rachis, which are covered with short, brown hairs.—*Hooker*, *Synopsis Filicum*, p. 385.

G. (Eugymnogramme) tomentosa — Eu-gym-nog-ram′-me ; to-men-to′-sa (tomentose, woolly), *Desvaux.*

A stove species, native of Brazil and Peru, somewhat resembling *G. rufa*, from which, however, it is readily distinguished through its fronds, 6in. to 12in. long, being invariably bipinnate (twice divided to the midrib) when fully developed. These fronds are borne on firm, erect stalks 6in. to 12in. long, of a chestnut-brown colour, and densely covered with reddish-brown hairs. The upper leaflets, which are distinctly stalked, are rounded or heart-shaped at the base, and entire or lobed ; the lower ones, 2in. to 4in. long, are furnished with several pinnules (leafits) of similar shape. The texture is soft and papery, and the copious sori (spore masses), which are very narrow, obliquely branched, and of a reddish-brown colour, extend all along the veins of the under-surface.—*Hooker*, *Species Filicum*, v., p. 144. *Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Lowe*, *Ferns British and Exotic*, i., t. 6B.

G. (Leptogramme) Totta — Lep-tog-ram′-me ; Tot′-ta (from Hottentot Country), *Schlechtendahl.*

This somewhat strong-growing and very distinct, stove species, also known as *G. Lowei*, has a very wide range of habitat, being a native of Cape

Colony, Madeira, Abyssinia, Ceylon, Java, Japan, Hong-Kong, the Himalayas, the Neilgherries, and the Pulney Hills, and, according to Beddome, common about Ootacamund. Its fronds, of a soft, papery texture, 1ft. to 1½ft. long, and 6in. to 10in. broad, are produced from a decumbent rhizome (stem), and borne on stalks 6in. to 12in. long and slightly scaly below. They are bipinnatifid (twice divided half-way to the midrib), being furnished with sessile (stalkless), spear-shaped leaflets 3in. to 5in. long, about 1in. broad, with blunt, undivided lobes reaching about half-way down. The narrow-oblong and simple sori (spore masses) are sometimes very profuse.—*Hooker*, *Species Filicum*, v., p. 138. *Lowe*, *Ferns British and Exotic*, i., t. 12. *Beddome*, *Ferns of Southern India*, t. 49.

G. (Ceropteris) triangularis—Ce-rop′-ter-is ; trĭ-ang-ul-a′-ris (triangular), *Kaulfuss.*

A very pretty, greenhouse species, of dwarf habit, commonly known as the "Californian Gold Fern," and, according to Eaton, very common on rocky hills nearly throughout California, extending northward to Oregon and southward to Ecuador. Its elegant little fronds are deltoid (in shape of the Greek delta, Δ), 3in. to 4in. each way, and borne on slender, dark chestnut-brown, glossy stalks 6in. to 12in. long and produced in tufts. The lowest leaflets are much longer than the next pair, and have their segments on the lower side much elongated ; the other leaflets, which are spear-shaped and deeply cleft into oblong, blunt lobes, decrease regularly upwards from the second pair. The texture is somewhat leathery ; the upper surface is smooth and of a dark green colour, while the under-side is densely coated with a powder which varies from deep orange to sulphur-colour, and occasionally even to white, and in which the black sori (spore masses) are deeply imbedded on the veins. — *Hooker*, *Species Filicum*, v., p. 146. *Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Eaton*, *Ferns of North America*, ii., t. 48.

G. (Ceropteris) trifoliata—Ce-rop′-ter-is ; trif-ol-ĭ-a′-ta (three-leaved), *Desvaux.*

This conspicuous and most remarkable, stove species, whose habitat extends from Cuba southward to Peru and Brazil, bears no resemblance whatever to any other member of the genus ; its mode of growth, the shape

of its fronds, and its general aspect being so many characters peculiar to this species only. Its fronds, of a somewhat climbing nature, 2ft. to 3ft. long, and 4in. to 8in. broad, are borne on stout, upright stalks 4in. to 6in. long, of a dark chestnut-brown colour, and scaly at their lower part. The lower leaflets are trifoliate (having three leaflets), the upper ones are simple (Fig. 72), and all are distinctly stalked, 2in. to 4in. long, narrow-oblong, and with nearly or quite entire edges, and of a soft, papery texture. The upper surface is of a dull, dark green colour; the under-side—usually naked in the barren fronds—is clothed in the fertile ones with a farinose powder varying from the purest white to a lemon-colour. The abundant sori (spore masses), disposed on each side of the midvein, are very conspicuous.—*Hooker*, *Species Filicum*, v., p. 149. *Nicholson*, *Dictionary of Gardening*, ii., p. 105. *Lowe*, *New and Rare Ferns*, t. 31.

Fig. 72. Gymnogramme trifoliata (much reduced).

C. trifoliata is a robust grower, and under liberal treatment and when grown in such a place that its gradually-extending fronds can be trained near the glass of the roof, it forms a very picturesque object.

G. (Eugymnogramme) vestita — Eu-gym-nog-ram′-me ; ves-ti′-ta (clothed), *Hooker*.

This most distinct species, native of Pekin and the North-Western Himalayas, where it is found up to 8000ft. elevation, succeeds equally well

in either stove or greenhouse temperature. Its elegant fronds, 6in. to 12in. long, 1in. to 1½in. broad, and simply pinnate (only once divided to the midrib), are borne on wiry stalks 3in. to 6in. long and densely clothed with more or less matted, bright rusty-brown scales of a very soft, silky nature. The pinnæ (leaflets) are sometimes disposed in pairs and opposite, but are more frequently arranged in an alternate manner, and in either case are set close to the midrib with a little space between each; they are entire (undivided), bluntish, and oblong, or sometimes heart-shaped at the base; though of a thick texture, they are of a flaccid nature, and are covered on both sides with fine, velvety hairs, that are silvery in the young fronds, but of a rusty-brown colour in fully-developed specimens. The abundant sori (spore masses) are usually forked, and are disposed over the whole of the under-surface. Fig. 73 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker*, *Species Filicum*, v., p. 143. *Beddome*, *Ferns of British India*, t. 154.

Fig. 73. Gymnogramme vestita (⅔ nat. size).

G. (Leptogramme) villosa—Lep-tog-ram′-me; vil-lo′-sa (shaggy), *Link*.

A very distinct, stove species, native of Brazil, with fronds 1ft. to 1½ft. long, 6in. to 10in. broad, bipinnatifid (twice divided half-way to the midrib), and borne on firm, erect stalks 6in. to 9in. long, densely clothed with soft, spreading, greyish hairs. The leaflets, 3in. to 5in. long and ¾in. broad, are cut rather more than half-way down into nearly sickle-shaped, entire (undivided) lobes, which are narrowed at the base; they are of a soft, papery texture, and densely shaggy on both surfaces. The oblong sori (spore masses) occupy an oblique position in the lower part of each lobe.—*Hooker*, *Synopsis Filicum*, p. 376. *Lowe*, *Ferns British and Exotic*, i., t. 11.

G. (Syngramme) Wallichii—Syn-gram′-me ; Wal-lich′-ĭ-i (Wallich's), *Hooker.*

A stove species, of medium dimensions, native of Borneo, Singapore, Sarawak, and Labuan, with undivided fronds, borne on firm, glossy stalks 6in. to 18in. long and of a chestnut-brown colour. The leafy portion, 6in. to 10in. long and 1½in. to 2in. broad, is oblong-spear-shaped, pointed at its extremity, gradually narrowed at the base, and of a somewhat leathery texture. Both sides are naked, and the narrow-oblong sori (spore masses) extend on all the veins from the midrib to near the edge.—*Hooker*, *Species Filicum*, v., p. 155, t. 302. *Beddome*, *Ferns of British India*, t. 153.

G. Wettenhalliana — Wet-ten-hal-lĭ-a′-na (Wettenhall's). A garden variety of *G. pulchella.*

G. (Selliguea) Wrightii—Sel-li′-guĕ-a ; Wright′-ĭ-i (Wright's), *Hooker.*

This stove species, native of Loo-Choo and Formosa, produces from a wide-creeping rhizome (prostrate stem) of firm texture and covered with small, narrow, dull brown scales, very curiously-shaped fronds of a soft, papery texture, naked on both sides, and borne on firm, naked stalks 3in. to 4in. long. The leafy portion, 1ft. to 1½ft. long and 1in. to 1½in. broad, is sharply pointed at its summit, with the edge irregularly bowed ; it is suddenly narrowed about the middle, and below this very gradually into the stalk. The sori (spore masses) are disposed in continuous, oblique, parallel rows, one between each main vein. — *Hooker*, *Species Filicum*, v., p. 160, t. 303.

GYMNOPTERIS—Gym-nop′-ter-is. *See* **Acrostichum.**

GYMNOTHECA—Gym-noth-e′-ca. *See* **Marattia.**

CHAPTER XXIII.

HELMINTHOSTACHYS, *Kaulfuss.*

(Hel-minth-os′-tach-ys.)

Indian Flowering Fern.

THE name of this monotypic genus is derived from *helmins*, *helminthos*, a little worm, and *stachys*, a spike, in allusion to the arrangement of the spore masses, which form a peculiarly loose spike. *Helminthostachys* is included in the sub-order *Ophioglossaceæ*, and forms in Hooker and Baker's "Synopsis Filicum" Genus 74; it is composed of a solitary handsome, stove species, of singular appearance and closely allied to *Botrychium*.

Culture.

H. zeylanica is a species somewhat difficult of cultivation, requiring stove temperature all the year round and a constantly moist place. The soil best suited to its requirements is a compost made of two parts rich loam, one part leaf mould, and one part sand. Its propagation is very slow, as it very seldom forms double crowns, and young plants have never, to our knowledge, been raised from its spores, which are disposed in small, crested clusters, forming a long, loose spike of peculiar shape. This plant being deciduous, care must be taken that, during the resting season, its roots and rhizome, both of which are of a succulent nature, do not become dry, in which case it would seriously suffer and possibly die outright. *H. zeylanica* is of little value as a pot plant, but highly interesting when grown in a warm

Fernery in a moist situation, where it does not get disturbed during the resting season.

H. dulcis—dul′-cis (sweet). Synonymous with *H. zeylanica.*

H. zeylanica—zey-lan′-ic-a (Cingalese), *Hooker.*

This Fern, native of Ceylon, the Philippine Islands, New Caledonia, and Queensland, is a plant of unique appearance, also known in gardens as *H. dulcis.* Its fronds, which are produced from a thick, fleshy, short-creeping rhizome (prostrate stem), and borne on stalks often 1ft. long, are composed of two very distinct parts and of a somewhat leathery texture. The barren portion is often cleft into three principal divisions, which are stalked and again pinnate (divided to the midrib) or sometimes forked, their ultimate divisions being narrow-oblong, 3in. to 4in. long, about 1in. broad, pointed at the extremity, and slightly toothed at the edges. The fertile portion of the frond takes the form of a solitary spike arising from the base of the barren segments; it is usually 3in. to 4in. long, ½in. broad, and borne on a peduncle (stalk) about as long as itself.—*Hooker*, *Second Century of Ferns*, t. 94; *Garden Ferns*, t. 28. *Beddome*, *Ferns of Southern India*, p. 23, t. 69.

HEMIDICTYUM—He-mid-ic′-tŷ-um. *See* **Asplenium.**

CHAPTER XXIV.

HEMIONITIS, *Linnæus.*

(He-mĭ-on-ī′-tis.)

Ivy-leaved Ferns.

THIS genus, composed exclusively of small-growing Ferns with peculiar-shaped fronds, is included in the tribe *Grammitideæ*, and forms in Hooker and Baker's "Synopsis Filicum" Genus 59. It is the old Greek name used by Dioscorides (from *hemionos*, a mule, supposed to be barren) without any apparent reason, as these plants are undoubtedly fertile. It forms a small group of stove plants whose habitat is almost confined to the Tropics, and which are readily distinguished through their spore masses being disposed in continuous rows along, and sometimes also developed between, the veins, as in *Anetium* of Splitgern, in which division they are reticulated (forming a regular little network).

Culture.

Although some eight or nine species of *Hemionitis* are known and described, only three or four of them are usually found in cultivation: these are easily-grown plants of dwarf habit, very useful for decoration and also for growing in Fern-cases, where they thrive luxuriantly even if planted in moss only. When grown in pots, all these singular Ferns require is a mixture of two parts of fibrous, soft peat, and one part of sand, or where the peat obtainable is of a somewhat close nature, the mixture is benefited by the

addition of one part of chopped sphagnum. It is essential, on account of the few roots which they produce, that these plants should be kept in pots of comparatively small dimensions and that the drainage should be perfect. All are liable to the depredations of the green-fly, which is easily destroyed by slight fumigations ; occasionally, also, thrips may make their appearance on the foliage, in which case the most efficacious treatment consists in a dip in a slight solution of lemon oil.

The plants are readily propagated from spores, which germinate freely, and also by means of the young plants which most kinds produce at the base and at the notches of the segments of the fronds, which, for that purpose, should be firmly laid on a surface of the soil recommended above.

Principal Species.

H. citrifolia—cit-rif-ol′-ĭ-a (Citrus-leaved), *Hooker.*

This singular, stove species, native of the West Indies, which by its mode of fructification connects the tribe *Grammitideæ* with that of *Acrostichеæ*, has the habit of *Antrophyum*, in which genus it is placed by Fée. Its singular, pendent, oblong or somewhat spoon-shaped fronds, 6in. to 20in. long, 1in. to 4in. broad, and narrowed gradually to both ends, are produced from a creeping rhizome (prostrate stem), and borne on weak, compressed stalks varying from ½in. to 9in. in length. These fronds are of a pale green colour, of a thick but flaccid texture, and have the edge entire ; and their midrib, often lost in the upper part, is winged on the back below. The loose and abundant sori (spore masses) are placed on the veins and also scattered in the spaces between them. This is the *Anetium* of Splitgern.—*Hooker*, *Species Filicum*, v., p. 193.

H. cordata—cor-da′-ta (heart-shaped), *Roxburgh.*

This very distinct, stove species (Fig. 74), native of Ceylon, Moulmein, the Philippines, and also of various parts of Peninsular India, where, according to Beddome, it is a common Fern in dry localities in the plains and low mountain tracts, being seldom found at great elevations, is so very unlike any other known Fern in general outline that it forms a striking contrast with its associates wherever it is introduced. Its fronds, which are produced from

an underground, creeping rhizome (stem), are of two kinds. The barren ones, 2in. to 3in. each way, heart-shaped, bluntish at the point, and with rounded basal lobes and a deep notch between them, are borne on dark chestnut-brown, glossy stalks 2in. to 4in. long. The fertile fronds have their lobes much sharper, the whole leafy portion being nearly triangular; these are borne on stalks similar to those of the barren fronds, but often 1ft. long. Both kinds are of a somewhat leathery texture, smooth and dark green on the upper surface, whereas their under-side, which is slightly hairy and of a paler colour, is completely covered with sori (spore masses) that are narrow at first but eventually become confluent. The barren fronds are proliferous at their base, where one or several little bulbils are produced, and by means of these this species can easily be propagated.—*Hooker, Species Filicum*, v., p. 192. *Nicholson, Dictionary of Gardening*, ii., p. 135. *Lowe, Ferns British and Exotic*, vii., t. 38. *Beddome, Ferns of Southern India*, t. 53.

Fig. 74. Hemionitis cordata (⅛ nat. size).

H. Griffithii—Grif-fith′-ĭ-i (Griffith's), *Hooker and Thomson.*

A stove species, native of Khasya and Formosa, with fronds 1ft. or more long, 6in. to 9in. broad, and borne on stalks 8in. to 12in. long, woolly throughout, and scaly towards the base. The fronds are usually pinnate

(once divided to the midrib), with two to four distinct leaflets on each side; these leaflets are 3in. to 4in. long, 1½in. broad, entire, sharp-pointed, and of a papery texture. The abundant and conspicuous sori (spore masses) are disposed all along the veins on the under-surface of the fronds.—*Hooker*, *Species Filicum*, v., p. 192. *Beddome*, *Ferns of British India*, t. 155.

H. hederæfolia—hed-er-æ-fol′-ĭ-a (Ivy-leaved), *J. Smith.*

The fronds of this stove species, native of Mexico, borne on naked, ebeneous (blackish) stalks 1ft. long, are about 3in. each way, and composed of five entire lobes: the three central ones about equal, spear-shaped; the lateral ones spreading, shorter, and blunter. The texture is soft and papery, and both surfaces are densely matted with short, silky, yellowish-grey hairs. The sori (spore masses) are disposed on the veins only. — *Hooker*, *Synopsis Filicum*, p. 398.

Fig. 75. Hemionitis palmata (¼ nat. size).

H. lanceolata — lan-cĕ-ol-a′-ta (spear-shaped), *Hooker.*

A singular, stove species, native of the Fiji Islands, with egg-shaped or oblong-spear-shaped fronds 6in. to 9in. long, 1½in. to 2½in. broad, pointed at their summit and narrowed at the base, of a leathery texture and naked on both sides. The copious sori (spore masses) are confined to the veins.—*Hooker*, *Species Filicum*, v., p. 191; *Second Century of Ferns*, t. 55.

H. palmata—pal-ma′-ta (palmate, hand-shaped), *Linnæus.*

This dwarf-growing and thoroughly distinct, stove species, native of the West Indies and Mexico, is generally known by the name of the "Ivy-leaved Fern," an appellation quite appropriate, as its palmate fronds, 2in. to 6in. each way, are composed of five nearly equal divisions (Fig. 75); but there the comparison ends, for they are covered on both sides with rusty-coloured

hairs, which extend all along the stalks. The fertile fronds, which have their divisions more sharply defined, are borne on glossy, dark chestnut-brown stalks 6in. to 12in. long and upright; whereas the barren ones, with lobes shorter, blunter, and less divided, are borne on similar stalks, but only 2in. to 4in. long, and their habit is horizontal: both kinds are of a soft, papery texture and pale green in colour. The narrow sori (spore masses) are disposed all along the veins, and are so copious as to eventually become confluent.—*Hooker*, *Species Filicum*, v., p. 192. *Nicholson*, *Dictionary of Gardening*, ii., p. 135. *Lowe*, *Ferns British and Exotic*, viii., t. 37.

H. pinnata—pin-na′-ta (having pinnate fronds), *J. Smith.*

The general aspect of this stove species, native of Jamaica, is that of the better-known *Gymnogramme rufa*, its fronds, 5in. to 6in. long, 3in. to 4in. broad, and borne on glossy, dark chestnut-brown stalks 6in. to 9in. long, being simply pinnate (only once divided to the midrib), but their leaflets are attached to the midrib all the way. These leaflets are oblong-spear-shaped, about 1½in. long and ½in. broad, the lowest larger and forked at the base; they are of a soft, papery texture, and thinly covered on both sides with soft, yellowish hairs. The sori (spore masses) are confined to the veins.—*Hooker*, *Synopsis Filicum*, p. 399. *Nicholson*, *Dictionary of Gardening*, ii., p. 135.

H. Zollingeri—Zol-lin′-ger-i (Zollinger's), *Kurz.*

A singular and pretty, stove species, native of Java, with its curious fronds disposed in a dense rosette. The barren ones, which are nearly sessile (almost stalkless), somewhat spear-shaped, and entire, are 3in. to 4in. long; the fertile ones, borne on stalks 1½in. to 2in. long, are linear (very narrow), 3in. long, and about ¼in. broad: both are of a parchment-like texture. The sori (spore masses) are disposed in two or three rows parallel with the midrib and the edge, and are connected by short crossbars also covered with spore masses.—*Hooker*, *Synopsis Filicum*, p. 518.

CHAPTER XXV.

HEMITELIA, *Brown.*

(He-mit-e′-lĭ-a.)

OMPOSED of tropical species of arborescent habit resembling Cyatheas, this genus forms as it were a connecting link between those plants and the Alsophilas, and the species are often difficult to recognise—a circumstance that accounts for the popular error respecting *H. capensis*, which is usually called *Alsophila capensis*. The name *Hemitelia* is derived from *hemi*, half, and *telia*, a lid, in reference to the shape of the indusium (covering) of the sori (spore masses), which is in the form of a scale, situated on their under-side, varying in size, shape, and texture, and often deciduous. The sori themselves, invariably situated upon a vein or veinlet, are roundish, and, when seen through a magnifying lens, appear to resemble mulberry fruits in miniature. *Hemitelia* represents an important section of the tribe *Cyatheæ*, and in Hooker and Baker's "Synopsis Filicum" forms Genus 5. Although not numerous, the species are widely scattered over tropical countries, four or five being native of South America, the same quantity being indigenous to India, Ceylon, and the Pacific Islands, while others are of West Indian or of New Zealand origin. The plants are all furnished with ample fronds, simply pinnate (only once divided to the midrib) or decompound (many times divided); their veins are simple or branched, free or, those on the ribs especially, more or less intercrossing. To those with all the veins free T. Moore gave the name *Amphicosmia*, which has not been retained.

Culture.

With very few exceptions, the plants belonging to this genus require stove temperature—a fact which no doubt accounts for their not being more generally found in cultivation than they are at present. Most of them are strong growers, the trunks in many cases attaining 15ft. or more in height; they therefore require large structures to enable them to perfectly develop their broad, shining fronds, which have an imposing appearance in a Fernery planted in company with other kinds having more delicate or finely-divided foliage. The beauty of the under-surface of the fronds is greatly enhanced by the position of the sori, which usually form an almost uninterrupted line round the leaflets. The plants are not by any means difficult to grow if potted or planted in a mixture consisting of about equal parts of peat, loam, and sand, and if their requirements are punctually attended to. During the growing season they require, not only a good deal of heat, but also a large amount of moisture at the roots and along their trunks, most of which are of a drier and more wooden nature than those of other Tree Ferns.

Hemitelias are invariably propagated from their spores, which germinate freely, though they may also be increased by means of lateral offsets, which are occasionally produced along the trunks of certain species.

Principal Species.

H. andina—and′-in-a (from the Andes), *Karsten.*

A species of medium dimensions, native of the Andes of Columbia, with fronds tripinnatifid (three times divided nearly to the midrib) and borne on strong, naked stalks of a brownish colour. The leaflets, oblong-spear-shaped and of a somewhat leathery texture, are 1¼ft. to 1½ft. long; they are divided into ligulate pinnules (strap-shaped leafits) 3in. to 3½in. long, about ½in. broad, and cut down to a broad wing, the lower ones being distinctly stalked. Both surfaces are naked and bright green. The small and abundant sori (spore masses) are situated close to the margin of the leaflets, and partly covered by a distinct, smooth involucre.—*Hooker, Synopsis Filicum*, p. 455.

H. apiculata—ap-ic-ul-a′-ta (sharp-pointed), *Hooker.*

A native of Mexico and Brazil, closely related to the better-known *H. grandifolia*, from which it differs principally through having the lobes of its leaflets mucronate (abruptly terminated by a hard, sharp point) at their extremity.—*Hooker*, *Synopsis Filicum*, p. 29.

H. bella—bel′-la (pretty), *Reichenbach.*

A species of large dimensions, also known as *Amphicosmia bella*, native of Caracas, with ample, pinnate fronds of a somewhat leathery texture, and borne on strong stalks distinctly spiny at the base. Their leaflets, distinctly stalked, 1ft. to 1½ft. long, and 1½in. broad, are entire at their extremity, the rest being cut half-way to the midrib into very blunt, broadly egg-shaped, spreading lobes. The sori (spore masses) are disposed quite on the margin, where they form a continuous single line, following the sinuous (wavy) outline of the lobes to the extreme point of the leaflets.—*Hooker*, *Synopsis Filicum*, p. 29.

H. calolepis—cal-ol′-ep-is (having beautiful scales), *Hooker.*

This large species, native of Cuba, derives its name from the white, overlapping, satiny scales with which the base of the stalks of its fronds is copiously clothed, and which are 1in. or more in length, with a brown line down the centre. Scales of the same nature and colour, but of much smaller dimensions, are also noticeable on the midribs of the under-part of the ample, bright green, bipinnate fronds, the leaflets of which, 1½ft. long and oblong-egg-shaped, are divided into pinnules (leafits) 4in. to 5in. long, 1in. broad, and cut nearly to the midrib into numerous linear-oblong, blunt, coarsely-toothed lobes remarkable by the forking of their veins. The small sori (spore masses), disposed at the forking of the veins, mostly towards the midrib, are partly covered by a broken involucre, which is most conspicuous at the lower side.—*Hooker*, *Synopsis Filicum*, p. 29.

H. capensis—ca-pen′-sis (from the Cape of Good Hope), *R. Brown.*

This is the *Amphicosmia capensis* of Moore and the *Alsophila capensis* of J. Smith, under which latter appellation it is more popularly known, and is minutely described in Lowe's and other works. *H. capensis* is a very interesting, greenhouse species, native, as its name implies, of South Africa ;

it is of easy culture, and is rendered very attractive by a filamentous growth much resembling a Hymenophyllum or a Trichomanes, at all times covering

Fig. 76. Pinna of Frond and Filamentous Growth at base of Rachis of Frond of Hemitelia capensis (nat. size).

the crown, and which is produced by the lower leaflets becoming abortive and forming a mass of transparent segments with a stiff midrib (Fig. 76). Each successive frond increases the quantity of this most peculiar growth,

as it does not fall off with the fronds on which it is dependent, but remains behind, giving the trunk all the appearance of being covered with very minutely-divided Filmy Ferns. In fact, the resemblance is such that Kaulfuss, in mistake, named the growth *Trichomanes (?) cormophyllum*. The trunk, slender and seldom perfectly straight, in some instances reaches a height of 15ft., though 10ft. to 12ft. is more its usual height. The fronds, which are somewhat sparingly produced, are from 3ft. to 5ft. in length and furnished with lanceolate pinnæ (spear-shaped leaflets), terminating in a sharp point and deeply pinnatifid (divided almost to the base), forming sharp-pointed, sickle-shaped segments of a thin, papery texture, and dented like a saw. They are of a particularly light green colour, and the much-elevated and mostly solitary sori (spore masses) are situated at the forking of the base of the lowest vein on the upper part of the segments. Besides the singular growth above mentioned, this species differs from nearly all other Hemitelias, as also from nearly all Dicksonias, Alsophilas, and Cyatheas, in producing on the sides of its trunk lateral growths which, when detached, reproduce plants exactly similar to the parent plant.—*Hooker*, *Species Filicum*, i., p. 36. *Nicholson*, *Dictionary of Gardening*, ii., p. 135. *Lowe*, *Ferns British and Exotic*, viii., t. 62 (as *Alsophila capensis*).

H. costaricensis—cos-ta-ri-cen′-sis (from Costa Rica), *Mettenius*.

A native of the above-named habitat and also of Panama, with ample fronds three times divided nearly to the midrib and furnished at their base with broad, brown, pale-edged scales. The leaflets are spear-shaped and furnished with sessile, ligulate pinnules (stalkless, strap-shaped leafits) cut down to a narrow wing into oblong, nearly sickle-shaped, sharp-pointed segments of a somewhat leathery texture and sparsely bristly on the ribs on their under-surface. The sori (spore masses), which are disposed close to the midrib, are diminutive yet distinct.—*Hooker*, *Synopsis Filicum*, p. 455.

H. decipiens—de-cip′-ĭ-ens (deceiving), *Scott*.

This species, which, according to Beddome, is a native of the tropical forests of Sikkim, where it was discovered by Dr. Anderson growing at 2000ft. elevation, is called "Puysheck Nock" by the Lepchas, and is also known in gardens as *Alsophila decipiens*. It is a robust-growing kind; its large fronds are tripinnate (three times divided to the midrib), and the pinnæ (leaflets) are

somewhat spear-shaped, 1½ft. to 2ft. long, and furnished with nearly stalkless, spear-shaped pinnules (leafits) 4in. to 5in. long, nearly 1in. broad, and cut down to the midrib or to a narrow wing. The ultimate segments or subdivisions, of a sub-coriaceous (almost leathery) texture, are about one line broad, falcate (sickle-shaped), pointed, and toothed. The upper surface is of a dark green colour, and the fronds are hairy on the ribs only. The sori (spore masses), small and costular (disposed on the midvein or costa), are enclosed in a half-cup-shaped, irregular involucre of a very fragile nature.—*Hooker*, *Synopsis Filicum*, p. 455. *Beddome*, *Ferns of British India*, t. 311.

H. denticulata—den-tic-ul-a′-ta (furnished with small teeth), *Hooker*.

A native of Elizabeth Island, South Pacific, readily distinguished by the membranous but firm texture of its ample, smooth fronds. These fronds are bi- or tripinnate (twice or three times divided to the midrib); the leaflets are 14in. to 15in. long, 4in. to 6in. broad, distinctly stalked, pinnate about two-thirds of their length, but pinnatifid (cleft partly to the midrib) only at their pointed extremity. The pinnules (leafits), almost stalkless and pinnatifid half-way to the midrib, are 2in. to 3in. long, ½in. broad, oblong, and divided into broadly-egg-shaped, finely toothed and notched lobes. The small and abundant sori (spore masses) are situated on the back of the unbranched veins or in the axils (forkings) of the forked ones, nearer the margin than the costule (midrib).—*Hooker*, *Synopsis Filicum*, p. 31.

H. Durvillei—Dur-vil′-lĕ-i (Durville's). A synonym of *H. tahitensis*.

H. grandifolia—gran-dif-ol′-ĭ-a (large-fronded), *Spruce*.

This species is a native of the West Indies, New Granada, and Guiana, where it is abundant, producing from a trunk 4ft. to 5ft. high its ample, pinnate fronds, which are borne on conspicuously prickly stalks. These fronds are furnished with sessile pinnæ (stalkless leaflets) of a somewhat leathery texture, 1ft. to 1½ft. long, 1in. to 2in. broad, pinnatifid half or three-quarters of the way to the midrib, their broadly-oblong, blunt lobes being toothed like a saw at the extremity. The sori (spore masses) are situated on the free veins and disposed in an uninterrupted line between the midrib and the margin, often nearer the latter.—*Hooker*, *Species Filicum*, i., p. 30, t. 14A. *Nicholson*, *Dictionary of Gardening*, ii., p. 135.

H. horrida—hor′-rid-a (horrid, thorny), *Brown.*

This highly ornamental species, native of the West Indies and New Granada, and generally known as *Cyathea horrida*, is one of the most gigantic of the whole genus, and when given plenty of room makes a noble and striking object in the warm Fernery. Its handsome fronds, of a bright glossy green colour on their upper surface, slightly hairy and of a lighter hue underneath, attain a length of from 7ft. to 10ft.; they are only once divided to the midrib, and are borne on strong stalks which, like the trunk, are of a light brown colour, often woolly near the base, and thickly set with long, stout thorns—hence its specific name. The sessile pinnæ (stalkless leaflets), 1ft. to 2ft. long, are broadly oblong-spear-shaped, deeply cleft, with lobes oblong-spear-shaped, usually entire, and pointed. The sori (spore masses), situated on the free veinlets, form a continuous line just within the margin.—*Hooker*, *Species Filicum*, i., p. 30, t. 15. *Nicholson*, *Dictionary of Gardening*, ii., p. 135.

H. Karsteniana—Kar-sten-ĭ-a′-na (Karsten's), *Klotzsch.*

A very distinct species, native of Caracas, with ample fronds of a leathery texture, borne on strong stalks rough and prickly at the base, where white scales with a dark brown centre may be noticed. The fronds are simply pinnate (only once divided to the midrib) and their sessile pinnæ (stalkless leaflets), 8in. to 12in. long and 1½in. to 2½in. broad, are entire or more or less lobed at the very margin. The sori (spore masses) are disposed in two oblique lines, meeting towards the midrib and forming a series of letters V between each pair of midveins.—*Hooker*, *Synopsis Filicum*, p. 27. *Nicholson*, *Dictionary of Gardening*, ii., p. 135.

H. Lindeni—Lin′-den-i (Linden's), *Hooker.*

This is a species of comparatively small dimensions, native of Caracas. Its pinnate fronds are furnished with shortly-stalked leaflets of a thin texture, 6in. to 12in. long, 1in. to 1¼in. broad, finely pointed, and with the margin cleft, forming regular, short lobes having their point directed upwards. The sori (spore masses) show a peculiar arrangement, as they are disposed in two or three irregular lines or series at the margin of the leaflets.—*Hooker*, *Icones Plantarum*, t. 706.

H. Lindigii—Lin-dig′-ĭ-i (Lindig's), *Baker.*

A greenhouse species, native of the Andes of Bogota, distinct through its ample fronds being tripinnatifid (three times divided nearly to the midrib), and borne on straw-coloured, smooth stalks. The leaflets, 1½ft. to 2ft. long, are divided into sessile, ligulate pinnules (stalkless, strap-shaped leafits) 3in. to 4in. long, cut down to a broad wing, and forming blunt, close, and distinctly-toothed segments of a rigidly leathery texture, and green on both sides. The sori (spore masses) are small and disposed near the midrib; they are partly covered with minute, smooth involucres.—*Hooker, Synopsis Filicum*, p. 454.

H. macrocarpa—mac-roc-ar′-pa (large-fruited), *Presl.*

A native of Bahia and British Guiana, with a trunk reaching 7ft. to 8ft. in height, and stalks of a dark brown colour. Its ample fronds are bipinnate (twice divided to the midrib) with leaflets 14in. or more long, 6in. broad, stalked and pinnate below, pinnatifid only above. The abundant sori (spore masses) form a single series, generally on the forking of a vein, half-way between the margin and the midvein.—*Hooker, Synopsis Filicum*, p. 30.

H. Melleri—Mel′-ler-i (Meller's), *Baker.*

A native of Madagascar, with ample fronds three times divided to the midrib; these are furnished with oblong-spear-shaped leaflets 1ft. to 1½ft. long, and sessile pinnules (stalkless leafits) 2½in. to 3in. long, closely set and cut down to the midrib into blunt, strap-shaped, toothed segments of a moderately firm texture. The fronds are green on both sides and naked except on the ribs above. The small and abundant sori (spore masses) are disposed close to the midveins and partly covered by a smooth, depressed involucre of a parchment-like texture.—*Hooker, Synopsis Filicum*, p. 456.

H. Moorei—Moor′-ĕ-i (Ch. Moore's), *Baker.*

A very pretty and distinct species, native of Lord Howe's Island, with fronds quadripinnatifid (four times divided nearly to the midrib). These fronds are borne on smooth stalks, and their rachises (stalks of the leafy portion) are of a dull brown colour and covered with a meal-like powder beneath. The oblong leaflets, 8in. to 12in. long, are furnished with stalkless,

overlapping, spear-shaped pinnules 2½in. to 3in. long, divided into strap-shaped, blunt segments that are wedge-shaped at the base, deeply cleft, of a somewhat leathery texture, dark green on their upper surface, paler underneath, and clothed on the ribs with short, broad, white scales. The minute sori (spore masses) are disposed close to the midvein; they are partly covered by a small, smooth, depressed involucre, of thin, parchment-like texture.—*Hooker*, *Synopsis Filicum*, p. 455.

H. multiflora—mul-tif-lo′-ra (many-flowered), *R. Brown.*

A native of Guiana, Columbia, and the Amazon Valley, with fronds tripinnatifid (three times divided nearly to the midrib) and borne on stalks full of sharp points and furnished at their base with firm, spear-shaped scales of a dark brown colour. The leaflets, oblong-spear-shaped and 1ft. to 1½ft. long, are furnished with strap-shaped pinnules (leafits) 3in. to 4in. long, cut down to a narrow wing into blunt segments of a moderately firm texture, bright green on the upper surface, and paler beneath. The sori (spore masses) are small and medial, and are partly covered with a smooth involucre of firm texture.—*Hooker*, *Species Filicum*, i., p. 31. *Nicholson*, *Dictionary of Gardening*, ii., p. 135.

H. petiolata—pet-ĭ-ol-a′-ta (furnished with petioles or stalks), *Hooker.*

This species, native of the Isthmus of Panama, is very distinct through the large, glossy scales of a chestnut colour, but pale at the edge, with which the prickly stalks on which the fronds are borne are densely clothed. Its large fronds, twice or three times divided to the midrib, are pinnatifid only at their extremity; their leaflets and leafits, distinctly stalked and oblong-spear-shaped, are more or less pointed, sometimes entire (undivided), sometimes more or less deeply cleft, with rounded or broadly-oblong lobes. This species is also rendered very interesting and ornamental through its sori (spore masses) forming a beautifully continuous border at the very margin, and following the sinuous (wavy) outline of the lobes.—*Hooker*, *Species Filicum*, p. 31, t. 16.

H. platylepis—plat-yl′-ep-is (flat-scaled), *Hooker.*

This species, native of Rio Nigro, Brazil, and also known under the name of *Amphicosmia platylepis*, is very distinct, the stout, smooth frond-stalks being

clothed at the base with very large, glossy scales of a dark brown colour, but showing a pale fringe at the margin. The ample fronds are tripinnate (three times divided to the midrib); their leaflets, 12in. to 14in. long, are pinnate except at the extremity, of a somewhat leathery texture, and hairy on both sides. The rachises (stalks of the leafy portion) are very hairy and slightly winged, and the ultimate leafits or lobes, ¼in. long, have their margins recurved and sharply dented. The abundant sori (spore masses) are disposed one to each lobe, and partly covered by a large, round, cup-shaped involucre.—*Hooker*, *Second Century of Ferns*, t. 100.

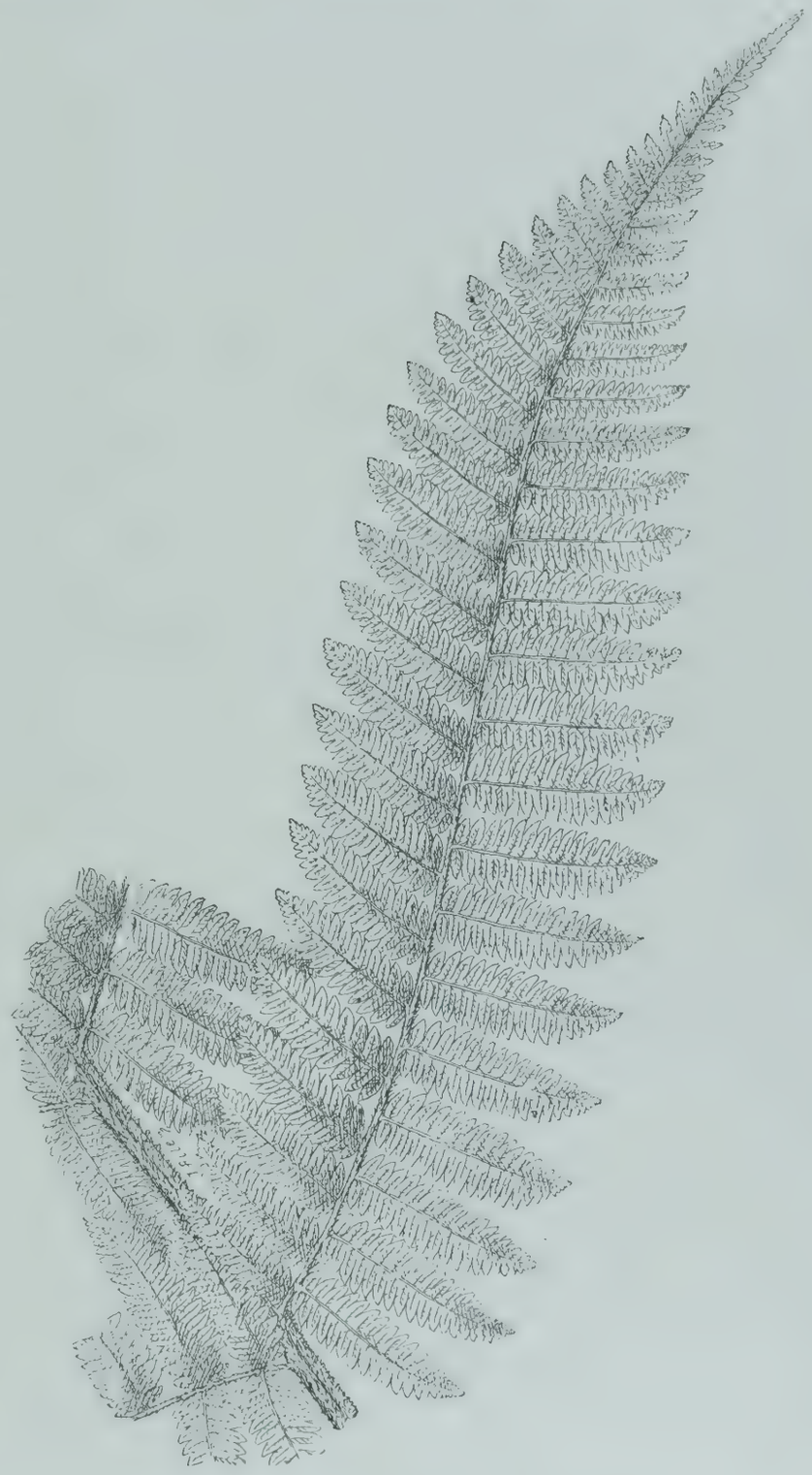


Fig. 77. Portion of Frond of Hemitelia Smithii (nearly nat. size).

H. setosa—se-to′-sa (bristly), *Mettenius.*

A very handsome species, native of Brazil, with ample fronds three times divided to the midrib, and borne on short, rough stalks of a peculiar grey colour, having at their base narrow scales of a dark brown colour. The oblong-spear-shaped leaflets are 1ft. to 1½ft. long in the middle of the frond; the lowest are dimorphous (of two forms), with pinnate segments. The pinnules (leafits), 3in. to 4in. long, are cut down to the midrib below into bluntish, sickle-shaped lobes, the barren ones closely set, the fertile ones

narrower and with a space between them; they are of a moderately firm texture, smooth and green on both sides. The sori are disposed close to the midveins. This species is the *Alsophila setosa* of Kaulfuss (*Hooker*, *Species Filicum*, i., p. 46) and the *Cyathea Beyrichiana* of Presl.—*Hooker*, *Species Filicum*, i., p. 21. *Nicholson*, *Dictionary of Gardening*, ii., p. 135.

H. Smithii—Smith′-ĭ-i (Smith's), *Hooker*.

This very handsome, greenhouse species, native of New Zealand, popularly known as *Cyathea Smithii*, is a very striking Tree Fern, with a trunk 10ft. to 15ft. high, bearing a quantity of beautifully bipinnate (twice-divided) fronds 5ft. to 7ft. long. These fronds are borne on stalks which, like the crown itself, are densely clothed on their whole length with long, hair-like, chaffy scales, of a bright chestnut colour. Their rachises (stalks of the leafy portion) are provided with similar scales, their long and narrow leaflets are 8in. to 12in. long, and their deeply-dented leafits (Fig. 77), are very smooth and of a pale green colour on both sides. The sori (spore masses) are situated on the forking of the veins, and are partly covered by a roundish involucre. This species is highly decorative on account of its graceful fronds, of a particularly light or feathery appearance for a Tree Fern, but it does not bear the action of the sun so well as most of the other species of this genus. There is no record of *H. Smithii* having ever been raised from spores in Europe.—*Hooker*, *Flora of New Zealand*, ii., p. 8, t. 72. *Nicholson*, *Dictionary of Gardening*, ii., p. 135.

H. speciosa—spec-ĭ-o′-sa (showy), *Hooker*.

This large species, also known as *Amphicosmia speciosa* and *Cyathea speciosa*, is a native of New Granada. It forms a trunk 20ft. to 24ft. high, from which ample, pinnate (once-divided) fronds are produced. These fronds, when young, are, as well as the stalks on which they are borne, clothed with long, dark, glossy scales, which have a very narrow, pale fringe; they usually attain about 6ft. in length, and are furnished with long, sword-shaped leaflets, sharply pointed at their extremity (Fig. 78), entire or merely undulated at the margin, and of a firm, parchment-like texture. The sori (spore masses) are arranged in a sinuous, continuous line, just within the margin.—*Hooker*, *Species Filicum*, i., p. 28, t. 13. *Nicholson*, *Dictionary of Gardening*, ii., p. 136.

H. tahitensis—ta-hi-ten′-sis (from Tahiti), *Baker.*

A stove species, of large dimensions, native of the Society Islands, with ample fronds three times divided to the midrib, and spear-shaped leaflets, 1ft. or more long, furnished with sessile, ligulate pinnules (stalkless, strap-shaped leafits) 2in. to 3in. long, of a somewhat leathery texture and densely hairy on the ribs of their upper surface. The sori (spore masses) are disposed on the midvein, and covered with a half-cupshaped, entire involucre. This is the *H. Durvillei* of gardens.—*Hooker, Synopsis Filicum*, p. 455.

H. Walkeræ—Walk′-er-æ (Mrs. Walker's), *Hooker.*

Fig. 78. Hemitelia speciosa (much reduced).

A handsome species, native of Ceylon, where it is found at an altitude of 6000ft. Its ample fronds, bi- or tripinnate (twice or three times divided to the midrib), of a thick, firm, leathery texture, are borne on smooth or slightly rough stalks. The leaflets, 1½ft. long, are furnished with pinnules (leafits) 3in. to 4in. long, cleft sometimes nearly, sometimes quite, to the midrib, forming oblong, very blunt, entire or slightly-notched lobes, often scaly on the ribs beneath. The spore masses occupy the lowest forking of the veins close to the midrib, and are furnished with a large, roundish involucre, at first covering the lower half of the sorus (spore mass), and at length more or less reflexed (thrown back) and often two-lobed; but in the way of fructification this species is very variable, some specimens of it having the characters of true Hemitelias, some resembling Alsophilas, while others have involucres nearly like those of Cyatheas. It is the *Amphicosmia Walkeræ* of Moore.—*Hooker, Species Filicum*, i., p. 24.

H. Wilsoni—Wil′-son-i (Wilson's), *Hooker.*

This very peculiar and distinct species, of large dimensions, is a native of Mansfield, near Bath, Jamaica, where it grows at an altitude of 1000ft. Its trunk, of a somewhat slender nature, attains from 12ft. to 14ft. in height, and produces fronds 12ft. long and 4½ft. broad, bipinnate (twice divided to the midrib), and borne on stalks about 2½ft. long. The oblong, sharp-pointed leaflets, 1½ft. long and 4in. to 5in. broad, are deeply pinnatifid (cleft nearly to the midrib) at their extremity; their pinnules (leafits) are oblong-spear-shaped, stalkless, of a parchment-like texture, smooth, and bright green in colour. The small and abundant sori (spore masses) form a line about midway between the midrib and the margin; they are provided with a pale brown involucre (covering) of parchment-like texture, often irregularly two-lobed.—*Hooker, Synopsis Filicum*, p. 30.

HETEROPHLEBIUM—Het-er-oph-leb′-ĭ-um. *See* **Pteris.**

HEWARDIA—Hew-ard′-ĭ-a. *See* **Adiantum.**

HOLOCHLÆNA—Hol-och-læ′-na. *See* **Pellæa.**

HUMATA—Hum-a′-ta. *See* **Davallia.**

HYMENODIUM—Hym-en-o′-dĭ-um. *See* **Acrostichum.**

HYMENOLEPIS—Hym-en-ol′-ep-is. *See* **Acrostichum.**

CHAPTER XXVI.

HYMENOPHYLLUM, *Linnæus.*

(Hym-en-oph-yl′-lum.)

Filmy Ferns.

THE genus *Hymenophyllum*, which derives its name from *hymen*, a membrane, and *phyllon*, a leaf, on account of the peculiar transparency of the leaves of the plants contained in it, and which in the formation of the tribe *Hymenophylleæ* is equal in importance to *Trichomanes*, is a group of mostly dwarf and sometimes very minute plants, for the most part resembling Mosses more than Ferns. They are natives of tropical and temperate climates, one species only (*H. tunbridgense*) being indigenous in England, where it is frequently found clothing trunks of trees and surfaces of damp rocks. The plants are usually provided with long-creeping, thread-like rhizomes (prostrate stems) of a wiry nature. Their fronds, delicately membranous and often of a lurid or olive-green colour, are simple (uncut), like those of *H. cruentum*, or slightly lobed, like those of *H. asplenioides*, in one section; smooth and from once to four times pinnatifid (cleft partly to the midrib), like those of *H. demissum* and *H. polyanthos*, in another; whereas those of a third section are of a hairy nature, as in *H. æruginosum* and *H. obtusum*, and more or less ciliated on the edges, as in *H. ciliatum* and *H. valvatum*. The distinguishing characters of the species, however, reside in the position of the sori (spore masses): these are always disposed on the very margin of the frond, in which they are either more or less sunk or exserted (thrust out), and always terminate a vein. These spore masses are furnished with an inferior involucre (covering)

more or less deeply two-lipped or bivalved, of nearly the same texture as the frond, and either toothed, fringed, or entire. The capsules, which are mostly orbicular (quite or very nearly round), are pressed down, attached by the centre, and furnished with a broad, transverse ring which opens irregularly at the apex and forms a purse-like process.

A sub-division of the genus was formerly recognised by Presl and by Van den Bosch under the name *Leptocionium*. This was composed of species having fronds more or less divided and spiny, and finely toothed on the edges, either smooth, like those of *H. tunbridgense*, or crisped, like those of *H. dichotomum*. This name, however, has been abandoned by the authors of the "Synopsis Filicum," in which work *Hymenophyllum* forms Genus 16.

Culture.

To the particulars already given in the chapter on "Filmy Ferns" in general (pp. 73-81 of Vol. I.), we may here add that, as regards Hymenophyllums, with the exception of the beautiful *H. fuciforme* and *H. pulcherrimum*, nearly all the species at present known are of creeping habit, and that, being provided with shallow-rooting rhizomes, they succeed best when growing on the surface of a rock and allowed to run under the moss which covers it, as is shown most emphatically by the glorious vegetation noticeable in the truly grand Fernery of Messrs. J. Backhouse and Son, of York. It is also worthy of notice that the great majority of the plants contained in the genus are native of New Zealand, Tasmania, and Chili, where they exist in a climate naturally cool and humid, and of the East and West Indies, where they grow spontaneously under trees at high elevations; in such situations they are permanently subjected to the influences of shade and moisture, and also to a comparatively cool temperature.

Hymenophyllums are particularly well adapted for growing in Fern-cases in town; they are all the more valuable by reason of their foliage, though apparently of a delicate nature, not being, like that of most other Ferns, affected by the London fogs, which prove so destructive to vegetable life in general. This has been repeatedly noticed by the various Fern lovers and growers who give this class of plants preference over all other Ferns. Thus, for instance, it is on record that in north windows on the staircase of his

house in Upper Grosvenor Street the late Mr. J. Cooper Forster grew plants of *H. demissum* to perfection, the fronds retaining their vitality for several years; Dr. John Winter, of 28, Montpellier Road, Brighton, grows with great success a whole collection of Filmy Ferns in his rooms exclusively; while another illustrious member of the medical profession, Dr. J. Braxton Hicks, has for many years, and, as he says, without much trouble, grown masses of *Trichomanes radicans* to perfection in his London house, 24, George Street, Hanover Square, in the midst of smoke and dust, and of fogs in winter.

Among the many Filmies which succeed so well under his care and special attention, Mr. J. F. Marchant, of 59, Berners Street, may proudly call the attention of his visitors to the unique specimen of *H. pulcherrimum* which forms the subject of our illustration, and which he has grown to its present extraordinary size in a window-case, and exclusively in a cold room. In each of the above-mentioned cases the plants were subjected to the action of frost, and did not suffer from it. They require constant moisture, but this should be produced more by means of condensation than by mechanical waterings, to which these plants are decidedly averse, especially the species with hairy or woolly foliage, which greatly suffer from being syringed overhead. In a letter to us on the subject, Mr. Marchant, who is a very careful observer, says: "I have been trying a method which is proving most satisfactory. I have had a large pit excavated under a spreading tree. I then made a bed of cement to just cover the bottom, and hold say 1in. of water over the whole surface, all the Ferns are placed on bricks or on inverted pots, and the whole is covered with three-frame lights. I get a splendid condensation and much time is saved, as no overhead syringing is required."

Hymenophyllums require but little light and only a small depth of soil to grow in, as their slender rhizomes, mostly of a wiry nature, have the greatest objection to being buried under the loose material in which they delight to grow. When the plants are cultivated in pots or in pans the compost should be made of sandy peat, chopped sphagnum, and small pieces of sandstone, in about equal parts, with an additional sprinkling of coarse crock dust, the whole being made so light and permeable as to be prevented under any circumstances from becoming sour through the accumulated moisture resulting from the repeated sprinklings and waterings necessary to produce

condensation. Some species, especially among the most dwarf-growing kinds, succeed best when established on a piece of sandstone without any other material. This is a mode adopted by Mr. Ulbricht, an enthusiastic amateur, of Belmont, Queen's Road, Leytonstone, who has derived great satisfaction from that uncommon way of growing them, and who may well be proud of the achievement, as he has proved most successful in the cultivation of these his favourite plants.

Hymenophyllums are propagated but slowly—a fact which no doubt accounts for their prices remaining higher than those of ordinary Ferns. We have known only one batch of young seedlings, and these, even when five years old, did not show their true characters. The plants are, however, commonly increased by the division of their rhizomes, an operation which is safe enough, although it is one requiring a little patience. Draughts must be carefully avoided at all times of the year, and air should only be very sparingly admitted into the case.

Principal Species and Varieties.

H. abruptum—ab-rup′-tum (abrupt), *Hooker*.

This lovely, dwarf-growing species, also known as *H. brevifrons*, is a native of Jamaica, Cuba, Venezuela, and Brazil, growing on trunks of trees and rocks, which it densely covers, and to which it gives quite a mossy appearance. Its delicate little fronds, seldom more than 1in. long and ½in. broad, are borne on very slender stalks ¼in. long and of a wiry nature ; they are pinnatifid (divided half-way to the midrib), glossy, and of a curving habit. The sori (spore masses), one or two to a frond, are terminal on the upper leaflets, and provided with an involucre (covering) that is divided not more than half-way down, with a wedge-shaped base and rounded valves.—*Hooker*, *Species Filicum*, i., p. 88, t. 31. *Nicholson*, *Dictionary of Gardening*, ii., p. 165. *Lowe*, *New and Rare Ferns*, Addenda, p. 181.

H. æruginosum—ær-u-gin-o′-sum (verdigris-covered), *Carmichael*.

A well-marked, distinct species, native of the Island of Tristan d'Acunha, where it is found pendent from rocks and trunks of trees. Its pretty fronds (Fig. 79), at all times covered with a whitish pubescence (down), are

2in. to 3in. long, 1in. or less broad, somewhat egg-shaped, and abundantly produced from extremely slender rhizomes (prostrate stems) of a woolly nature, which delight in finding their way through a piece of Tree Fern or in lying on a bare piece of sandstone. They are thrice divided half-way to the midrib, which is winged in its upper part. The leaflets are often much imbricated (overlapping), the lower ones being frequently fan-shaped. The sori (spore masses), two to twelve to a frond, are terminal on the segments, and provided with a small involucre (covering) divided nearly down to the base, with valves rounded and densely ciliated. The pubescence on the fronds in a young state is silvery, but with age it assumes a brown or tawny colour. Special care must be taken to prevent wetting the foliage of this species.—*Hooker*, *Species Filicum*, i., p. 93. *Nicholson*, *Dictionary of Gardening*, ii., p. 165. *Lowe*, *New and Rare Ferns*, Addenda, p. 181.

Fig. 79. Frond of Hymenophyllum æruginosum (nat. size).

H. andinum—and′-in-um (from the Andes), *Van den Bosch.*

A species, native of the Andes of Ecuador, closely allied to the better-known *H. polyanthos*, from which it is readily distinguished by its elongated and flaccid habit, as also by its fewer, more distant, and less-divided segments. —*Hooker*, *Synopsis Filicum*, p. 60.

H. asplenioides—as-ple′-nĭ-ŏ-i′-des (Asplenium-like), *Swartz.*

This charming little Fern, whose habitat extends from Cuba and Mexico southward to Brazil, where it is found pendent from mossy rocks and trunks of trees, is easily recognised by its peculiar habit of growth as also by the extremely delicate nature of its narrow, shining fronds, produced from very slender rhizomes (prostrate stems). These fronds are seldom more than 4in. long, 1in. broad, and have a singularly pretty, undulated appearance through their being divided into somewhat obtuse lobes down to within a short distance of the midrib. The sori (spore masses), one to four to a frond, are

terminal on the lobes, and are provided with an orbicular involucre (nearly round covering) cleft nearly to the base.—*Hooker*, *Species Filicum*, i., p. 87. *Nicholson*, *Dictionary of Gardening*, ii., p. 165. *Lowe*, *New and Rare Ferns*, Addenda, p. 181.

H. attenuatum — at-ten-ŭ-a′-tum (attenuated). This is a synonym of *H. magellanicum.*

H. axillare—ax-il-la′-rĕ (axillary), *Swartz.*

A species of dwarf dimensions, indigenous in the West Indies and Venezuela, with fronds 3in. to 8in. long, 1in. broad, narrow-oblong in shape, three times divided half-way to the midrib, of a flaccid and pendent nature, and produced from very slender rhizomes (prostrate stems). The main rachis (stalk of the leafy portion) is winged throughout or above only. The lower leaflets vary from ½in. long with simple segments, to 1½in. long with pinnatifid (cleft) leaflets and several segments. The sori (spore masses), two to twelve to a leaflet, are terminal on the lateral segments, and are provided with an involucre (covering) divided more than half-way down, with valves rounded and entire.—*Hooker*, *Species Filicum*, i., p. 111.

H. badium—bad′-ĭ-um (reddish, chestnut-brown), *Hooker and Greville.*

This thoroughly distinct species, which is very rare in cultivation, is a native of Sikkim, Nepaul, and the Malayan Peninsula. Its erect fronds, 4in. to 12in. long, 2in. to 3in. broad, oblong or broadly spear-shaped, and tripinnatifid (three times divided nearly to the midrib), are borne on stalks 2in. to 3in. long, of a slender nature, and winged above ; the main rachis (stalk of the leafy portion) is broadly winged throughout. The lower leaflets are divided down to the rachis into several pinnules (leafits) on each side, the lowest of which are several times deeply incised. The sori (spore masses), two to twelve to a leaflet, are terminal on the segments on both sides ; they are provided with an involucre (covering) that is divided down nearly to the base, and the rounded valves of which are nearly twice as broad as they are deep and toothed on their outer edge.—*Hooker*, *Species Filicum*, i., p. 102. *Hooker and Greville*, *Icones Filicum*, t. 76. *Beddome*, *Ferns of British India*, t. 282.

H. barbatum—bar-ba′-tum (bearded), *Baker.*

This little species, native of Tsus-Sima, near Japan, somewhat resembles *H. tunbridgense* in general appearance, but it is a stouter plant, with the rachis (stalk of the leafy portion) winged throughout, broader segments, and sori (spore masses) terminal on the segments of the upper leaflets. The sori are provided with a broadly-oblong involucre (covering), the valves of which are divided more than half-way down, and deeply spiny or toothed. —*Hooker, Synopsis Filicum*, p. 68.

H. bivalve—biv-al′-vĕ (two-valved), *Swartz.*

A species of medium dimensions, native of New Zealand, with fronds somewhat broadly triangular, 3in. to 8in. long, 2in. to 3in. broad, three times divided nearly to the midrib, and produced from naked rhizomes (prostrate stems) of a particularly wiry nature. While the main rachis (principal stalk of the leafy portion) is only slightly winged above, the secondary ones are winged throughout. The linear, finely-toothed ultimate segments bear numerous spore masses—often six to eight—which are provided with an entire, nearly globose involucre (covering), divided almost down to the base.—*Hooker, Species Filicum*, i., p. 98, t. 35. *Nicholson, Dictionary of Gardening*, i., p. 165.

H. Blumeanum—Blu-mĕ-a′-num (Blume's). A variety of *H. polyanthos.*

H. borneense—bor-ne-en′-sĕ (from Borneo), *Hooker.*

This is a very distinct species, of particularly dwarf habit, native of the hills near Sarawak, where it grows at an altitude of 2700ft. Its little fronds, square or fan-shaped in general outline, ½in. to ¾in. long, and ½in. broad, are borne on very slender stalks 1in. long, and cleft like a fan nearly to the base, the narrow divisions being repeatedly branched; the upper surface is hairy, and the margin is ciliated with reddish hairs. The sori (spore masses) are terminal, solitary, and nearly round; their wedge-shaped base is sunk in the frond, and their valves are hairy.—*Hooker, Synopsis Filicum*, p. 62.

H. Boryanum—Bo-rў-a′-num (Bory's). A synonym of *H. ciliatum.*

H. brevifrons—brev′-if-rons (short-fronded). Synonymous with *H. abruptum.*

H. Bridgesii—Bridg-e′-sĭ-i (Bridges'), *Hooker.*

A native of Chili and Chiloe, with fronds broadly triangular and tripinnate (three times divided to the midrib), borne on wiry, naked or woolly stalks 2in. to 6in. long. The fronds are 2in. to 6in. long and 2in. to 3in. broad at the base; the leaflets, also broadly triangular, have their pinnules (leafits) pinnate quite to the rachis. The very small sori (spore masses), often six to eight to a leaflet, are disposed one or two at the base of the pinnules, and provided with an oblong involucre (covering) divided about two-thirds of the way down, entire or very slightly toothed.—*Hooker*, *Species Filicum*, i., p. 97, t. 35c.

H. capillaceum—cap-il-la′-cĕ-um (hair-like), *Roxburgh.*

This pretty little species, confined to St. Helena, where it has been long known, much resembles in habit a slender form of *H. tunbridgense.*—*Hooker*, *Species Filicum*, i., p. 109, t. 38b.

H. Catherinæ—Cath-er-i′-næ (from St. Catherine's Peak), *Hooker.*

A small, neat, deeply-cut plant, with inconspicuous hairs, native of St. Catherine's Peak, Jamaica, where it grows at an elevation of 5000ft.—*Hooker*, *Synopsis Filicum*, p. 67.

H. caudiculatum—cau-dic-ul-a′-tum (tailed), *Martius.*

This large, erect-growing species is a native of Peru, Chili, and Brazil, where it is found growing on mossy trees and among decaying vegetable matter. It is undoubtedly one of the handsomest and most striking of our cultivated Hymenophyllums. The very translucid, erect, smooth, and shining fronds, 6in. to 15in. long, 2in. to 3in. broad, broadly spear-shaped, and three times divided nearly to the midrib, are borne on upright stalks 4in. to 6in. long, of a wiry nature, and broadly winged almost to the base. The leaflets are spear-shaped, and, as well as the extremities of the fronds, are furnished with a long tail at the extremity (hence the specific name); the lower ones, often 2in. long, are divided down to a broad, central rachis, their lower pinnules (leafits) being again cleft nearly to the midrib, while the upper ones are simple or only forked. The sori (spore masses), two to twelve to a leaflet, are placed at the extremity of the segments on both sides; they

are provided with a very large involucre (covering), divided nearly to the base, with valves twice as broad as deep and bluntly toothed.—*Hooker*, *Species Filicum*, i., p. 102. *Nicholson*, *Dictionary of Gardening*, ii., p. 166. *Lowe*, *New and Rare Ferns*, t. 68.

H. Cheesemanni—Cheese-man′-ni (Cheeseman's), *Baker.*

A species of very dwarf dimensions, native of the Titiranja Range, New Zealand, with small fronds forked or palmately three or four times divided to near the midrib, seldom 1in. long, including their filiform (thread-like) stalks. The sori (spore masses), which are terminal on the lobes, are provided with an involucre (covering) immersed at the base only, and having entire, rounded valves.—*Hooker*, *Synopsis Filicum*, p. 464.

H. chiloense—chi-lo-en′-sĕ (from Chiloe), *Hooker.*

This real gem amongst Filmy Ferns is a small, pendent, tufted species which, in Southern Chili and in Chiloe, is said to form a dense carpet over trees and rocks alike. Its pretty little fronds, triangular or broadly spear-shaped, seldom more than 2in. long and 1in. broad, are of a dull green colour, with very conspicuous, dark veins covering their entire surface; they are bipinnatifid (twice divided nearly to the midrib), their leaflets being regularly ciliated on the margin with short, strong hairs, and their under-surface slightly hairy. The sori (spore masses) are placed singly at the base of the leaflets on the upper side, divided about half-way down, with a wedge-shaped base free or sunk in the frond, and half-rounded, strongly-ciliated valves.—*Hooker*, *Species Filicum*, i., p. 90, t. 32. *Lowe*, *New and Rare Ferns*, t. 69A.

H. ciliatum—cil-ĭ-a′-tum (hairy), *Swartz.*

Somewhat similar in habit and general appearance to *H. chiloense*, though three times larger, this species has a very wide range of habitat, being common in Tropical America, from Cuba and Mexico southward to Chili and South Brazil; it is also found in the Eastern Himalayas, in West Tropical Africa, and in Mauritius, Madagascar, and the Bourbon Islands. The African plant well known as *H. Boryanum* seems quite to coincide with the American *H. ciliatum*. The fronds, 2in. to 6in. long, 1in. to 2in. broad in the centre,

oblong, and sharp-pointed, are three times divided nearly to the midrib, and borne on ciliated stalks 1in. to 2in. long, winged above and sometimes almost to the base. Their main rachis (stalk of the leafy portion) is broadly winged throughout and ciliated, and the leaflets and segments are hairy throughout, especially along the margin of the fronds. The sori (spore masses), two to twelve on a leaflet, are placed at the end of the lateral segments on both sides, and provided with an immersed, sub-orbicular involucre (covering) having valves divided about half-way down and conspicuously hairy. This species is particularly fond of running its slender, thread-like rhizomes (prostrate stems) into a piece of Tree Fern or of partially-decayed wood. It is also known as *H. Plumieri.—Hooker, Species Filicum*, i., p. 88. *Hooker and Greville, Icones Filicum*, t. 35. *Nicholson, Dictionary of Gardening*, ii., p. 166. *Lowe, New and Rare Ferns*, t. 69c. *Beddome, Ferns of British India*, t. 305.

H. crispatum—cris-pa′-tum (curled), *Wallich.*

Although sometimes recognised as simply a variety of *H. ciliatum*, and sometimes as a form of *H. javanicum*, this plant, which clothes the trunks of Tree Ferns in Tasmania and New Zealand, and is also a native of Nepaul, Ceylon, and Luzon, is very distinct. Its fronds, which are borne on erect stalks margined with a distinctly-crisped wing, are from 4in. to 7in. long, deep green, smooth, broad, erect or curving, somewhat dense, and three times divided nearly to the midrib into narrow, blunt segments. The abundant egg-shaped spore masses are occasionally disposed on the lateral segments, and are provided with an involucre (covering) having two valves divided to the base.—*Hooker and Greville, Icones Filicum*, t. 77. *Lowe, New and Rare Ferns*, t. 69b. *Beddome, Ferns of British India*, t. 305.

H. crispum—cris′-pum (curled), *Humboldt, Bonpland, and Kunth.*

A species closely allied in habit to *H. axillare*, but distinguished by its crisped fronds, which are borne on very slender, wingless stalks. It is a native of Tropical America, its habitat extending from Mexico and Cuba southward to Peru and Brazil.—*Hooker, Species Filicum*, i., p. 107.

H. cruentum—crŭ-en′-tum (blood-coloured), *Cavanilles.*

This distinct and most interesting species, native of Chili, especially the province of Valdivia, where it is found growing on trunks of trees, is quite

peculiar in its habit of growth and general aspect. It has very little of the appearance of a Hymenophyllum, as its delicately-transparent, seaweed-like fronds, which are produced from slender, creeping rhizomes (prostrate stems), are simple (undivided), broadly spear-shaped and slightly sinuated (wavy-margined); they are from 3in. to 5in. long, 1in. to 1½in. broad, borne on slender, naked stalks 3in. to 6in. long, and are most interesting on account of their venation, their simple (unbranched) and prominent veins reaching from the midvein to the margin at regular intervals. The sori (spore masses), six to twelve on each side of the frond, are disposed at the summit of the sinuations, their wedge-shaped base being sunk in the frond. Another peculiarity of this species, which greatly adds to its beauty, is the brownish-rosy colour of the old fronds, which remain on the plants for a very long time. —*Hooker, Species Filicum*, i., p. 87, t. 31. *Lowe, Ferns British and Exotic*, viii., t. 5A.

Fig. 80. Frond and Portion of Rhizome of Hymenophyllum demissum (¼ nat. size).

H. demissum — de-mis′-sum (hanging down), *Swartz.*

This species, native of New Zealand, Fiji, Java, and the Philippine and adjacent Polynesian Islands, is perhaps the most decorative and the easiest-grown of the entire genus, and is so well appreciated as to be found in every collection where an attempt at the cultivation of Filmy Ferns is made. Its fine fronds (Fig. 80), 4in. to 12in. long, 3in. to 4in. broad, and broadly triangular, are borne on upright, firm, wingless stalks 4in. to 6in. long and of a wiry nature; they are three or four times divided nearly to the midrib, and their lower leaflets, 2in. to 3in. long, are cut down very nearly to the rachis (stalk of the leafy portion) on both sides into numerous leafits, which are again divided into pinnatifid segments. The sori (spore masses) are very numerous (twenty to thirty to a leaflet), terminal and axillary on the segments on both sides, and provided with an involucre (covering) that is divided nearly to the base and has egg-shaped, entire or toothed

valves.—*Hooker*, *Species Filicum*, i., p. 109. *Nicholson*, *Dictionary of Gardening*, ii., p. 166. *Lowe*, *Ferns British and Exotic*, viii., t. 7B.

No Hymenophyllum is more effective than this species; it is a suitable companion for the Killarney Fern, with which, under cultivation, it is often found. The lively green colour of its young fronds, which, with age, turn to the deepest dark green, and the vigorous habit and constitution of the plant, are special recommendations.

H. denticulatum—den-tic-ul-a′-tum (toothed), *Swartz.*

A very distinct species, of small dimensions, native of Java and also of Moulmein, where it is found growing at 7000ft. elevation. Its little fronds, 2in. to 3in. long and 1in. broad at the base, are borne on erect, naked stalks 1in. to 2in. long; their leaflets are slightly crisped, the lower ones being deeply cleft into narrow segments. The sori (spore masses), usually simple, are placed at the axils on the upper side of the leaflets, and are provided with an egg-shaped involucre (covering) divided about two-thirds of the way down, spiny on the back, and having toothed valves.—*Hooker*, *Species Filicum*, i., p. 101.

H. dichotomum—dich-ot′-om-um (repeatedly divided into twos), *Cavanilles.*

This pretty, dwarf-growing species, native of Juan Fernandez and Chili, where it grows on mossy trees, is particularly striking on account of the beautifully-crisped and transparent characters of its finely-divided foliage, which distinguish it at first sight from any other species in cultivation. Its broadly-triangular fronds, two or three times divided nearly to the midrib, are 4in. to 6in. long, 2in. to 3in. broad, and borne on stalks 2in. to 3in. long, either naked or slightly margined, with an undulated and crisped wing on both sides; their lower leaflets, three times as long as broad, are divided into crisped segments that are sharply toothed or torn at the edges. The numerous sori (spore masses) are placed in the axils of the segments, and provided with a small, egg-shaped involucre (covering), having valves thorny on the back, divided about half-way down, and nearly entire at the summit.—*Hooker*, *Species Filicum*, i., p. 98, t. 36A. *Lowe*, *New and Rare Ferns*, Addenda, p. 182.

This little plant delights in sending its tiny rhizomes through a coating of moss covering either a piece of rock or a block of wood or Tree Fern.

H. dilatatum—di-la-ta′-tum (dilated, enlarged), *Swartz.*

This striking species, native of the Samoan, Fiji, and other Polynesian Islands, also of New Zealand and Java, where it is found growing among moss and decaying vegetable matter, and on trunks of trees, is one of the largest-growing as well as one of the noblest-habited plants belonging to this charming genus. Its beautiful and extremely translucid fronds, of a pale green colour, are produced from a slender, creeping rhizome (prostrate stem), and borne on erect stalks 2in. to 4in. long, of a wiry nature, and slightly winged above ; they are broadly spear-shaped, three times divided nearly to the midrib, 6in. to 12in. long, 4in. to 6in. broad, and have their main rachis (stalk of the leafy portion) winged throughout, the wing being quite flat. The lower leaflets, divided nearly down to the rachis, have their lower leafits again pinnatifid. The habit of the fronds is particularly graceful, as the weight of the broad leaflets causes them to droop in a very elegant manner. The sori (spore masses), two to twelve to a leaflet, are terminal or axillary on the segments on both sides, and are provided with an involucre that is divided about half-way down and has rounded and entire valves.—*Hooker, Species Filicum*, i., p. 104. *Hooker and Greville, Icones Filicum*, t. 60. *Lowe, New and Rare Ferns*, t. 70.

H. elasticum—el-as′-tic-um (elastic), *Bory.*

A pretty plant, of a woolly nature, native of the Seychelles, Mauritius, and Bourbon Islands, where it is abundant, and questionably distinct from the better-known *H. hirtellum.—Hooker, Synopsis Filicum*, p. 64.

H. elegans—e′-leg-ans (elegant). Synonymous with *H. lineare.*

H. exsertum—ex-ser′-tum (exserted, thrust out), *Wallich.*

This species, of medium growth, has a wide range of habitat, being found on the hills throughout India, from the Himalayas southward to Ceylon. Its oblong-spear-shaped fronds, twice divided nearly to the midrib, are borne on slender stalks 1in. to 2in. long ; they are seldom more than 6in. long and 2in. broad, and their main rachis (stalk of the leafy portion), which is winged above or throughout, is more or less densely clothed with deciduous hairs of a rusty-brown colour. The leaflets and their divisions or segments are also slightly hairy on the principal veins. The sori (spore masses), two to

eight to a leaflet, are terminal or axillary on the segments on both sides, and provided with an involucre (covering) that is divided down nearly to the base and has oblong valves bluntly toothed at the summit.—*Hooker*, *Species Filicum*, i., p. 109, t. 38A. *Beddome*, *Ferns of Southern India*, t. 9.

H. falklandicum—falk-land′-ic-um (from the Falkland Islands), *Baker*.

A species of small dimensions and very slender, upright habit (Fig. 81), native of the Falkland Islands. Its elegant little fronds, produced from a slender, thread-like, wide-creeping rhizome (prostrate stem), and borne on stalks of similar nature, ½in. to ¾in. long, are oblong and bipinnatifid (twice divided nearly to the midrib); they are 1in. to 2in. long and ½in. broad, with sessile pinnæ (stalkless leaflets) spreading upright, the upper ones either simple (undivided) or forked, the lower ones twice deeply cleft into ligulate (strap-shaped), very distinctly but finely toothed segments or lobes. The sori (spore masses) are solitary, disposed at the base of the upper leaflets on the upper side, and provided with an involucre (covering) having spear-shaped, entire valves.—*Hooker*, *Synopsis Filicum*, p. 68. *Nicholson*, *Dictionary of Gardening*, ii., p. 166.

Fig. 81. Hymenophyllum falklandicum (nat. size).

H. fimbriatum—fim-brĭ-a′-tum (fringed). A synonym of *H. javanicum*.

H. flabellatum—fla-bel-la′-tum (fan-like), *Labillardière*.

This lovely species, also known under the names of *H. nitens* and *H. nitidum*, is a native of Australia, Tasmania, and New Zealand, where it grows pendent from trunks of Tree Ferns and other trees, also from holes in rocks and roots of trees. It is very variable in size, compactness, and degree of elongation of its fronds, which are of a peculiar, glistening, bright

green hue, the same tint being found in both young and old fronds. According to the variety, the fronds are from 4in. to 12in. long, 2in. to 4in. broad, and borne on firm, erect, smooth stalks 2in. to 4in. long ; they are tripinnatifid (three times divided nearly to the midrib) and somewhat resemble those of *H. demissum* in outline, but are more spear-shaped, and their pinnæ (leaflets), instead of being smooth, have a crisped appearance, produced by a contraction which is natural to them. The lower leaflets, 1in. to 2in. long, are divided into several pinnules (leafits) that are distinct through their wedge-shaped base and furnished on both sides with several long, narrow segments. The sori (spore masses), six to twenty to a leaflet, are terminal on the lateral segments, and are provided with an involucre (covering) that is divided more than half-way down and has rounded and entire valves.—*Hooker*, *Species Filicum*, i., p. 111. *Hooker and Greville*, *Icones Filicum*, t. 197. *Nicholson*, *Dictionary of Gardening*, ii., p. 166. *Lowe*, *New and Rare Ferns*, Addenda, p. 182.

H. flexuosum—flex-ŭ-o′-sum (bending), *Cunningham.*

A Fern with beautifully crisped and undulated foliage, and a native of New Zealand, somewhat resembling *H. crispatum*, but with larger and more divided fronds, 10in. to 12in. long, broadly spear-shaped, and borne on distinctly-winged stalks ; they are four times divided nearly to the midrib, their ultimate segments being narrow and undulated. The numerous sori (spore masses), six to twenty to a leaflet, are terminal on the segments on both sides and provided with a large involucre (covering) that is entire and two-valved to the base. It is a species whose wiry rhizomes (prostrate stems) delight in decayed moss and vegetable matter, and also one of the few which do not suffer from wetting overhead. Although given in the "Synopsis Filicum" as simply a synonym of *H. javanicum*, *H. flexuosum* is usually accepted as a distinct species, and it is described and illustrated as such in *Hooker's Species Filicum*, i., p. 105, and *Icones Plantarum*, t. 962 ; also in *Lowe's New and Rare Ferns*, p. 179.

H. Forsterianum—Fors-ter-ĭ-a′-num (Forster's), *Schneider.*

This beautiful species, dedicated to the memory of the late J. Cooper Forster, was accidentally introduced into this country growing among some

clumps of Cattleyas imported from Brazil. At first sight it seems intermediate between *H. caudiculatum* and *H. dilatatum*, its large, handsome fronds, 1¼ft. long and fully 6in. broad, being borne on stalks which are 6in. to 8in. long, conspicuously winged to the very base, and measure in the leafy portion quite ¼in. in breadth. Their fronds are tripinnatifid (three times divided nearly to the midrib), the leaflets, 3in. long and not tailed like those of *H. caudiculatum*, as well as their segments, being of a light green colour, closely set, and prettily undulated. The sori (spore masses), two to six only on a leaflet, are terminal at the summit of the segments on the upper side only, and are provided with a very large involucre (covering) that is divided nearly to the base and has broad, entire valves smooth on the edges.

This is a very free-growing plant, whose wiry rhizomes (prostrate stems) are particularly fond of moss and decaying vegetable matter, and which produces fronds in great abundance.

H. fuciforme—fu-cif-or′-mĕ (Fucus-like), *Swartz.*

This handsome species, which takes rank amongst the strongest-growing Hymenophyllums, is a native of Chili and Juan Fernandez, where it grows on trunks of trees in shady woods. Its upright-growing fronds, of a glaucous (bluish-green) colour, 1ft. to 2ft. long, 4in. to 6in. broad, broadly spear-shaped, and three times divided nearly to the midrib, are borne on strong, erect stalks narrowly winged above; their main rachis (stalk of the leafy portion) is winged throughout, and their lower segments are two or three times forked. Instead of being produced from slender, wiry rhizomes (prostrate stems), like most of those of the other known species, the fronds in this case spring from thick, decumbent rhizomes, which have all the appearance of crowns. The numerous and comparatively small sori (spore masses) are disposed in the axils of the segments, and are provided with an involucre (covering) that is divided nearly to the base and has rounded, entire valves.—*Hooker, Species Filicum*, i., p. 103, t. 36D. *Lowe, New and Rare Ferns*, t. 72.

H. gracile—grac′-il-ĕ (slender), *Bory.*

A species of medium dimensions, native of Bourbon, Natal, and Mauritius, with spear-shaped fronds three times divided nearly to the midrib, 2in. to 6in. long, 1in. to 2in. broad, and borne on slender, wiry stalks 2in. to 3in. long.

The sori (spore masses), two to four to a leaflet, are terminal or axillary on the lateral segments, and are provided with an involucre (covering) that is not divided more than half-way down and has rounded valves.—*Hooker*, *Species Filicum*, i., p. 110. *Hooker and Greville*, *Icones Filicum*, t. 198.

H. Gunnii—Gun′-nĭ-i (Gunn's), *Van den Bosch.*

This dwarf species, native of Tasmania, produces from a long-creeping, thread-like rhizome (prostrate stem) its oblong fronds, which are two or three times divided nearly to the midrib, 2in. to 3in. long, about 1in. broad, smooth on both surfaces, and borne on stalks 1in. to 1½in. long and winged at the top. The sori (spore masses), as broad as the lobes, are provided with an involucre (covering) as broad as deep, and with rounded valves.—*Hooker*, *Synopsis Filicum*, p. 463.

H. hirsutum—hir-su′-tum (hairy), *Swartz.*

This extremely delicate-looking species is a native of Tropical America, from Cuba to South Brazil and Patagonia, where it forms on trunks of trees a closely-matted covering of wiry, thread-like rhizomes (stems), producing in great abundance narrow-oblong fronds 2in. to 6in. long and ½in. broad, on slender stalks 1in. to 2in. long, that are naked or slightly winged and hairy above. The fronds are once pinnatifid (divided nearly to the midrib), of a flaccid nature, often pendulous, of a pale colour, and hairy over the surface. The sori (spore masses), one to four to a leaflet, are terminal on the segments, and are furnished with a sub-orbicular involucre (nearly round covering), the wedge-shaped base of which is sunk in the frond, and the valves of which are very hairy.—*Hooker*, *Species Filicum*, i., p. 88. *Nicholson*, *Dictionary of Gardening*, ii., p. 166. *Lowe*, *New and Rare Ferns*, Addenda, p. 182.

This species succeeds best on a block of wood and in an upright position ; it requires a very humid but airy situation, and great care must be taken at all times that no water touches its fronds.

H. hirtellum—hir-tel′-lum (slightly hairy), *Swartz.*

A very pretty, delicate species, native of Jamaica, Guadeloupe, and Mexico, with pale green fronds 3in. to 6in. long, 2in. to 3in. broad, tripinnatifid (three times divided nearly to the midrib), clothed all over with soft, white

or tawny hairs, and borne on erect, round stalks 1in. to 4in. long and of a woolly nature. The main rachis (stalk of the leafy portion), equally woolly, is slightly winged above, and the lower pinnules (leafits) are again pinnatifid, with long, narrow, hairy segments. The sori (spore masses), two to twelve to a leaflet, are placed at the end of the lateral segments on both sides, and are provided with an orbicular involucre (covering) that is sunk in the frond and divided about half-way down, with valves strongly ciliated. —*Hooker*, *Species Filicum*, i., p. 90, t. 31D. *Nicholson*, *Dictionary of Gardening*, ii., p. 166. *Lowe*, *Ferns British and Exotic*, viii., t. 7A.

In the cultivation of this species, watering overhead must be carefully avoided.

H. interruptum—in-ter-rup′-tum (interrupted), *Kunze.*

This beautiful and interesting species, native of Guadeloupe and the mainland of South America, from Mexico and New Granada southward to Peru, where it is found growing on trees, has a peculiar appearance, produced by the habit of its elegantly-drooping or pendulous fronds, which are densely clothed with soft, tawny hairs. These fronds are borne on short, wiry, slightly hairy stalks, and vary from 6in. to nearly 3ft. in length and from 2in. to 5in. in breadth; in general outline they are long-spear-shaped and twice divided nearly to the midrib. The sori (spore masses), six to twelve to a leaflet, are terminal on the segments of both sides of the upper leaflets, and are provided with an involucre (covering) that is divided more than half-way down and has rounded and very hairy valves.—*Hooker*, *Species Filicum*, i., p. 92, t. 33B.

H. Jamesoni—Jame-so′-ni (Jameson's), *Hooker.*

A very distinct species, of medium dimensions, native of the Andes of Columbia, and readily distinguished by its long, narrow fronds, which are 3in. to 9in. long, ¾in. broad, of a flaccid nature, with the rachis (stalk of the leafy portion) only slightly winged towards the extremity and fringed throughout with spines of a soft yet tough texture. The leaflets, forked at their summit, show only one or two linear (long and narrow) segments on each side, and the sori (spore masses), disposed singly in the axils of the segments, have their egg-shaped valves conspicuously thorny.—*Hooker*, *Species Filicum*, i., p. 96, t. 35A.

H. javanicum—ja-van′-ic-um (Javanese), *Sprengel.*

This species, with which *H. fimbriatum* and *H. tasmanicum* are identical, has a very wide range of habitat, being found in India, from Nepaul and Sikkim to Ceylon, the Malayan Peninsula, the Philippines, New Zealand, and Australia. Its triangular fronds, 4in. to 8in. long, 3in. to 4in. broad, borne on erect stalks 2in. to 4in. long and margined above with a broad, crisped wing, are tripinnatifid (three times divided nearly to the midrib). The lower leaflets, 1½in. to 2in. long, are divided to a narrow, crisped centre into several flat or slightly-crisped leafits on both sides, the lower of which are deeply pinnatifid (Fig. 82). The sori (spore masses), six to twelve to a leaflet, are terminal and axillary on the segments on both sides, and are provided with an involucre (covering) that is about as broad as the segments, divided down nearly to the base, and furnished with roundish valves entire or dented. — *Hooker, Species Filicum*, i., p. 106. *Nicholson, Dictionary of Gardening*, ii., p. 166.

Fig. 82. Frond and Rhizome of Hymenophyllum javanicum (⅓ nat. size).

H. khasianum — khas-ĭ-a′-num (from Khasya), *Baker.*

A species of small dimensions, native of Khasya, with lanceolate (spear-shaped) fronds 2in. to 3in. long, produced from a wide-creeping, slender rhizome (prostrate stem), and borne on stalks ½in. to 1½in. long and winged upwards; they are three times divided nearly to the midrib, and the abundant and terminal sori (spore masses) are provided with an egg-shaped involucre (covering) that is divided down nearly to the base.—*Hooker, Synopsis Filicum*, p. 464.

H. lanceolatum—lan-cĕ-ol-a′-tum (spear-shaped), *Hooker and Arnott.*

A dwarf-growing species, native of the Sandwich Islands, with spear-shaped or oblong fronds 3in. to 6in. long, 1in. to 2in. broad, and borne on

slender, naked stalks 2in. to 3in. long and of a wiry nature. The fronds are three times divided nearly to the midrib, and are hairy only on their margins and midrib. The sori (spore masses), two to eight to a leaflet, are placed at the side or at the extremity of the lateral segments, and are provided with an involucre (covering) that is divided more than half-way down and has rounded and copiously-ciliated valves. — *Hooker*, *Species Filicum*, i., p. 94, t. 34B.

H. L'Herminieri—L'Her-min-ĭ-e′-ri (L'Herminier's), *Mettenius.*

A very dwarf-growing species, seldom exceeding 2½in. in height, native of Guadeloupe.—*Hooker*, *Synopsis Filicum*, p. 463.

H. Lindeni—Lin′-den-i (Linden's), *Hooker.*

This fairly robust-growing species is a native of the Andes of Venezuela and Ecuador. Its fronds, 6in. to 12in. long, 4in. to 6in. broad, and often recurved, are borne on stout, erect stalks 4in. to 6in. long, of a hairy nature; they are three times divided nearly to the midrib, their main rachis (stalk of the leafy portion) being also hairy and winged in the upper part. Their lower leaflets, 2in. to 4in. long, have numerous deeply-divided pinnules (leafits) on both sides, both surfaces of which are hairy. The very abundant sori (spore masses) are terminal on the segments, and are provided with an involucre (covering) having short, broad, and strongly-ciliated valves. — *Hooker*, *Species Filicum*, i., p. 93, t. 34C.

H. lineare—li-nĕ-a′-rĕ (long and narrow), *Swartz.*

This pretty and distinct species, also known as *H. elegans*, of a particularly hairy nature, has a very wide range of habitat, being found in Tropical America, from Jamaica and Mexico southward to Brazil and Peru, ascending on the Andes of Ecuador to 12,000ft., and occurring also in the Mauritius. Its pendulous fronds, 3in. to 8in. long, 1in. to 2in. broad, and of a flaccid nature, are produced from a slender, hairy, thread-like rhizome (prostrate stem); they are fully pinnate (divided quite to the midrib), their leaflets being deeply cut into simple or forked, linear (narrow) lobes with margin and surface densely hairy. The sori (spore masses), two to six to a leaflet, are terminal on the lateral segments, and are provided with an involucre (covering) that

is about as broad as the segments, and has rounded and strongly ciliated valves. In a natural state the long, narrow fronds form densely interlaced masses on rocks and trees.—*Hooker*, *Species Filicum*, i., p. 91.

H. magellanicum—mag-el-lan′-ic-um (from Magellan), *Willdenow.*

A species of particularly rigid, upright habit, native of Chili, Chiloe, and the Organ Mountains. Its oblong-triangular fronds, 3in. to 6in. long, 2in. to 3in. broad, and three times divided nearly to the midrib, are borne on erect, wiry stalks, 2in. to 4in. long, naked or margined on each side with an undulated and crisp wing. The broadly-triangular lower leaflets have deeply-cleft pinnules (leafits), furnished on each side with several segments toothed along their edges. The sori (spore masses), which are particularly small, are disposed six to ten to a leaflet, and are terminal on the segments of the upper leaflets ; they are provided with an oblong involucre (covering), having two short-toothed valves. This species is also known as *H. attenuatum*, and dislikes water on its fronds.—*Hooker*, *Species Filicum*, i., p. 99, t. 36B.

H. Malingii—Ma-ling′-ĭ-i (Maling's), *Mettenius.*

A New Zealand species, very closely related to the better-known *H. sericeum*, from which it differs principally in the total absence of a connecting membrane between the veins of the pinnæ (leaflets).—*Hooker*, *Synopsis Filicum*, p. 66.

H. marginatum—mar-gin-a′-tum (edged), *Hooker and Greville.*

A species of very small dimensions, native of Port Jackson, Australia, with linear (narrow) fronds, about 1in. long, one line broad, once or twice forked, and furnished with a central costa (midvein) ; they are of a firm texture, and have their margin bounded by a thickened line, and their summit emarginate (notched). The terminal and solitary sori (spore masses) are provided with an involucre (covering) that is nearly round, divided nearly to the base, and has convex, entire valves.—*Hooker and Greville*, *Icones Filicum*, t. 34. *Hooker*, *Species Filicum*, p. 87.

H. microcarpum—mi-croc-ar′-pum (small-fruited), *Desvaux.*

A species of a very hairy nature, native of South America, from Venezuela and Ecuador, southward to Peru and the south of Brazil. Its broadly-

triangular fronds, 6in. to 12in. long and 3in. to 5in. broad, are produced from a rhizome (prostrate stem) that is clothed with woolly, yellow hairs, and are borne on firm stalks 4in. to 6in. long, woolly, and slightly winged above; they are tripinnatifid (three times divided nearly to the midrib). The sori (spore masses), two to twelve to a leaflet, are placed at the extremity of the lateral segments of the upper leaflets, and are provided with an egg-shaped involucre (covering) that is divided to the base, with valves either toothed or ciliated.—*Hooker*, *Species Filicum*, i., p. 90, t. 32B.

H. microphyllum—mi-croph-yl′-lum (small-leaved), *Mettenius.*

This small-growing species, with thread-like rhizomes (prostrate stems), native of the Andes of Bogota, has the habit of small forms of *H. tunbridgense.* —*Hooker*, *Synopsis Filicum*, p. 463.

H. microsorum—mi-cros-o′-rum (having small sori), *Van den Bosch.*

This species, which is intermediate in habit between *H. exsertum* and *H. polyanthos*, is a native of the Sikkim Himalayas, where it was collected by Dr. Hooker at an elevation of 11,000ft. It is the plant that Beddome figures and describes under the same name as a variety of *H. polyanthos*, stating that it is found growing at 6,000ft. elevation on the Anamallay Mountains, where it is common on trunks of trees near the head of the Toracadu River, Ceylon. Its oblong-spear-shaped fronds, of a flaccid nature and tripinnatifid (three times divided nearly to the midrib), are 2in. to 3in. long, about 1in. broad, and borne on slender, naked stalks, 1in. to 2in. long, sometimes winged towards the summit. The main rachis (stalk of the leafy portion) is also naked, and furnished with a narrow wing extending nearly throughout. The sori (spore masses), two to twelve to a leaflet, are terminal on the lobes or segments of the upper pinnæ (leaflets), very small, and provided with an involucre (covering) that is divided more than half-way down, with valves rounded and entire.—*Hooker*, *Synopsis Filicum*, p. 59. *Beddome*, *Ferns of British India*, t. 306.

H. mnioides—mni-ŏ-ĭ′-des (Mnium-like), *Baker.*

A very curious, minute, moss-like plant, with the habit of *Mnium undulatum* or *M. serratum*, but dark brown in colour. It is closely allied

to *H. abruptum* and also to *H. tenellum;* but while the leaflets, instead of being more or less divided, are quite simple, the main rachis (stalk of the leafy portion) is scarcely winged below. This species is a native of Pic du Mont Mu, in New Caledonia, where it has been collected by Deplanche.—*Hooker, Synopsis Filicum*, p. 57.

H. Moorei—Moor′-ĕ-i (Ch. Moore's), *Baker.*

This curious little species, native of Lord Howe's Island, is of very small dimensions, its singular fronds, produced from a wide-creeping rhizome (prostrate stem), seldom measuring more than 1in. in height including the stalks on which they are borne; they are rounded in their upper and wedge-shaped in their lower half, and somewhat fan-shaped. The sori (spore masses), one to three to a frond, rarely terminal, are sunk in the frond at their base.—*Hooker, Synopsis Filicum*, p. 464.

H. multifidum—mul-tif′-id-um (much-cleft), *Swartz.*

A very elegant species, native of New Zealand and the Pacific Islands. The broadly-spear-shaped fronds, 2in. to 6in. long and 1in. to 5in. broad, are borne on wiry, naked stalks 2in. to 4in. long, their main rachis (stalk of the leafy portion) being winged above and wingless below; they are tripinnatifid (three times divided nearly to the midrib), with narrow ultimate segments. The sori (spore masses), two to twelve to a leaflet, are terminal on the lateral segments of the upper leaflets on both sides, and are furnished with an egg-shaped involucre (covering), the valves of which are divided not more than half-way down and entire. In exposed situations the fronds are much drawn together and the segments are recurved.—*Hooker, Species Filicum*, i., p. 98. *Hooker and Greville, Icones Filicum*, t. 167.

H. myriocarpum—my-rĭ-oc-ar′-pum (many-fruited), *Hooker.*

This species, native of Mexico and southward to the Andes of Peru, has pendent, broadly-spear-shaped fronds 3in. to 12in. long, 2in. to 3in. broad, and borne on stalks 2in. to 3in. long and slightly winged above; they are of a flaccid habit and three times divided nearly to the midrib, which is furnished with a narrow wing throughout. The very numerous sori (spore masses) are terminal and lateral on the segments on both sides; they are

provided with an involucre (covering) that is divided to the base and has egg-shaped or rounded valves entire or sinuated at the summit.—*Hooker*, *Species Filicum*, i., p. 106, t. 57D.

H. Neesii—Nees′-ĭ-i (Nees'), *Hooker.*

A species of small dimensions, native of Ceylon, Java, Borneo, Fiji, and the Philippine Islands. Its small, egg-shaped fronds, about 2in. long, ¾in. broad, and three times divided nearly to the midrib, are borne on naked or slightly-winged stalks 1in. to 2in. long. The rachis (stalk of the leafy portion) is winged throughout, the wing and leaflets being much crisped. The small and usually single sori (spore masses) are disposed in the axils of the upper leaflets; they are provided with an involucre (covering) that is nearly cylindrical below, divided more than half-way down, and having slightly-toothed valves.—*Hooker*, *Species Filicum*, i., p. 99. *Beddome*, *Ferns of British India*, t. 279.

H. nitens—nit′-ens (shining). A synonym of *H. flabellatum.*

H. nitidum—nit′-id-um (shining). A synonym of *H. flabellatum.*

H. nudum—nu′-dum (naked), *Desvaux.*

A small Fern, native of the West Indies, with fronds 1½in. to 3in. long, erect, broad, bipinnate (twice divided to the midrib), and fringed with hairs. —*Lowe*, *New and Rare Ferns*, Addenda, p. 182.

H. obtusum—ob-tu′-sum (blunt), *Hooker and Arnott.*

This small-growing species, native of Oahu, Sandwich Islands, is of a particularly woolly nature. It spear-shaped fronds, three times divided nearly to the midrib, 2in. to 4in. long, 1in. to 2in. broad, and borne on slender, ciliated stalks 2in. long, have their rachis (stalk of the leafy portion) winged throughout and the surface and margin of their pinnules (leafits) copiously clothed with pubescence. The sori (spore masses), two to six to a leaflet, terminal on the lateral segments, are provided with an involucre (covering) that is as broad as the segments, divided about half-way down, and having rounded and strongly-ciliated valves.—*Hooker*, *Species Filicum*, i., p. 98, t. 33D.

H. parvifolium—par-vif-ol′-ĭ-um (small-leaved), *Baker.*

This Fern, native of Moulmein, is the smallest and simplest species of the genus, its very minute fronds, narrow-oblong in shape, simple (undivided) or cleft at their summit, sometimes half-way down, and furnished with only a central vein, are seldom more than three lines long and one line broad. The solitary, terminal sori (spore masses) have their wedge-shaped base sunk in the frond, divided about half-way down, with rounded, entire valves.—*Hooker*, *Synopsis Filicum*, p. 56. *Beddome*, *Ferns of British India*, t. 225.

H. pastoense—pas-to-en′-sĕ (from Pasto), *Hooker.*

A robust-looking species, native of the Volcano of Pasto, Andes of Northern Ecuador. Its fronds are ovate-acuminate (egg-shaped and tapering into a point), fully bipinnate (twice divided to the midrib), 6in. to 12in. long, 4in. to 6in. broad, and borne on stout, upright stalks 4in. to 6in. long and densely hairy. The rachis (stalk of the leafy portion), equally strong, is densely clothed with rusty-brown hairs, which are also found on the rachis and margin of the leaflets. The sori (spore masses), twelve to twenty to a leaflet, are terminal on and broader than the segments ; they are furnished with a roundish involucre (covering) that is deeply two-valved, and the valves are only ciliated. —*Hooker*, *Synopsis Filicum*, p. 67.

H. pectinatum — pec-tin-a′-tum (comb-like), *Cavanilles.*

One of the most beautiful species of the whole genus, native of Chili and Chiloe, of great interest on account of the essentially distinct character of its oblong, pinnate (once-divided) fronds, 3in. to 6in. long, ½in. to 1½in. broad, and borne on naked stalks 2in. to 4in. long, of a particularly wiry nature. The main rachis (stalk of the leafy portion) is only winged towards the summit, and the leaflets are deeply cleft on their upper side into long, narrow, parallel segments that are simple (undivided) or of a slightly-forked nature (Fig. 83). The sori (spore masses), often six to eight to a leaflet and terminal on the

Fig. 83. Frond of Hymenophyllum pectinatum (½ nat. size).

lower segments of the upper side, are provided with an involucre (covering) that is divided nearly to the base and has egg-shaped, entire valves.—*Hooker*, *Species Filicum*, i., p. 96, t. 34D.

No description, however complete, can do justice to the elegant appearance of this plant, as the greyish-green colour of its fronds, as well as the very conspicuous and beautiful venation of its pinnules (leafits), which are restricted to the upper side of the leaflets only, are characters not shared by any other known species.

H. Plumieri—Plu-mĭ-e′-ri (Plumier's). Synonymous with *H. ciliatum*.

H. polyanthos—pol-ў-an′-thos (many-flowered ?), *Swartz*.

This very interesting species, also known as *H. Blumeanum* and *H. protrusum*, is subject to much variation in form ; it is very widely distributed, being found throughout the Tropics, and extending a little beyond them both North and South : in America—from Cuba and Jamaica southward to Brazil, South Chili, and Juan Fernandez ; in Asia—Nepaul and Sikkim to Ceylon, Tsus-Simi, the Malayan Peninsula, Java, and New Zealand ; in West Tropical Africa, Mauritius, and Madagascar. The broadly-oblong fronds, 2in. to 8in. long, 1in. to 3in. broad, and tripinnatifid (three times divided nearly to the midrib), are borne on slender, wingless stalks 2in. to 3in. long ; their main rachis (stalk of the leafy portion) is usually only narrowly winged above. The lower leaflets are divided to a narrow centre into several pinnules (leafits) on each side, which, in their turn, are deeply pinnatifid. The sori (spore masses), two to twelve to a leaflet, are terminal or axillary on the segments on both sides, and are provided with a small involucre (covering) that is divided nearly to the base and has egg-shaped or rounded, entire or slightly-toothed valves.—*Hooker*, *Species Filicum*, i., p. 107. *Nicholson*, *Dictionary of Gardening*, ii., p. 166. *Lowe*, *Ferns British and Exotic*, viii., t. 8A. *Beddome*, *Ferns of British India*, t. 280.

This species does not require such a close temperature as do most Hymenophyllums ; the most airy place in the house suits it best. It is provided with exceedingly slender, wiry rhizomes (prostrate stems), which delight in making their way through partly-decayed vegetable matter ; on that account it makes a beautiful object on a block of wood, its slender, elegantly-arching fronds then showing themselves to great advantage.

H. p. Blumeanum—Blu-mĕ-a′-num (Blume's), *Sprengel.*

This totally distinct form, native of Ceylon and the Malayan Islands, is very elegant in habit; its fronds are much narrower and more elongated than those of the typical plant; they are borne on long, naked stalks, and their pinnæ (leaflets), irregular in shape and size, and remote, are sometimes simply pinnatifid (only once divided nearly to the midrib).—*Hooker, Synopsis Filicum*, p. 60. *Beddome, Ferns of Southern India*, t. 266.

H. protrusum—pro-tru′-sum (protruded). Synonymous with *H. polyanthos.*

H. pulcherrimum—pul-cher′-rim-um (most beautiful), *Colenso.*

As its name implies, this comparatively rare species, native of New Zealand, where it is found on trunks of trees, is very handsome (see Plate). Its lovely fronds, 6in. to 12in. long and 4in. to 6in. broad, are produced from a thick and closely-set crown, and are borne on erect stalks 3in. to 4in. long, of a wiry nature, and winged down to the base. They are broadly triangular, tri- or quadripinnatifid (three or four times divided nearly to the midrib), and of a very graceful habit; they are not exactly pendulous, but being borne on robust stalks they are partly erect, and then the weight of their leafy portion causes them to arch over in a most agreeable manner. The main rachis (stalk of the leafy portion) is slightly winged throughout, and the lower leaflets, which have their midrib flexuose (bending) and are slightly waved, with several distinct pinnules (leafits) on both sides, are subdivided into segments which are again pinnatifid in their lower divisions. The sori (spore masses) are numerous, axillary and terminal on the segments on both sides, and provided with a round involucre (covering) that is divided nearly to the base, the valves being entire.—*W. Hooker, Species Filicum*, i., p. 103, t. 37A. *J. Hooker, Flora of New Zealand*, 232, t. 74. *Lowe, New and Rare Ferns*, t. 71.

H. pumilum—pu′-mil-um (little), *Ch. Moore.*

A remarkably dwarf species, native of Mount Tomah, New South Wales, with little, entire (undivided) fronds, seldom more than 1in. high, including the short stalks on which they are borne. The sori (spore masses), one only to a frond, are terminal; they are provided with a deeply-cleft involucre (covering) having egg-shaped, entire valves.—*Hooker, Synopsis Filicum*, p. 464.

H. rarum—ra′-rum (rare), *R. Brown.*

This close-growing species has a wide range of habitat, being found pendent from trees in Chili, Cape Colony, and Mauritius, as well as in Tasmania and New Zealand, where it densely covers trunks of Tree Ferns with its pendent fronds. These fronds are of a flaccid nature, 2in. to 6in. long, 1in. to 2in. broad, and borne on very slender stalks 1in. to 3in. long; they are oblong in shape and bipinnatifid (divided twice nearly to the midrib). The leaflets, simple, narrow, forked, or pinnatifid, show two or three deeply-cut segments on each side. The large sori (spore masses), which are terminal on the segments of the upper leaflets, are provided with an involucre (covering) that is divided half-way down or more and has a wedge-shaped base and rounded valves.—*Hooker*, *Species Filicum*, i., p. 101. *Nicholson*, *Dictionary of Gardening*, ii., p. 166. *Lowe*, *New and Rare Ferns*, Addenda, p. 182.

H. r. imbricatum—im-bric-a′-tum (overlapping), *Colenso.*

This variety, native of New Zealand, differs from the species only in having the stalk of its leafy portion much shortened, and the pinnæ (leaflets) overlapping and slightly crisped.—*Hooker*, *Synopsis Filicum*, p. 58.

H. recurvum—re-cur′-vum (crooked), *Gaudichaud.*

A species very closely allied to the better-known *H. caudiculatum*, with fronds of about the same size and similarly divided. It is common in the Sandwich Islands.—*Hooker*, *Synopsis Filicum*, p. 61.

H. reniforme—re-nif-or′-mĕ (kidney-shaped), *Hooker.*

A species of medium growth, native of the Andes of Ecuador and Peru, and closely resembling, in general habit, *H. crispum*, from which it is readily distinguished by its truly-bipinnate (twice-divided) fronds and by their very narrow segments. The specific name here applies to the shape of the involucre (covering) with which the sori (spore masses) are provided, and not, as in *Adiantum reniforme* and *Trichomanes reniforme*, to the shape of the frond. —*Hooker*, *Species Filicum*, i., p. 110, t. 38c.

H. sabinæfolium—sab-i-næ-fol′-ĭ-um (Savin-leaved), *Baker.*

A small-growing species, native of Salak, Java, with egg-shaped or triangular fronds 1in. to 2in. long, more than 1in. broad below, and borne on

naked or slightly-winged stalks 1in. to 2in. long. The pinnæ (leaflets) are crisped, and their very narrow ultimate segments, are deeply cut nearly to the midrib by numerous strong, aristate (awned) teeth ; this character is so conspicuously developed that the ordinary appearance of a Hymenophyllum is quite lost, and a frond looks more like a miniature branch of *Juniperus Sabina.—Hooker, Synopsis Filicum*, p. 71.

H. scabrum—scab′-rum (rough), *A. Richard.*

A truly beautiful and very distinct species, native of New Zealand, and one of the most decorative of the whole genus, on account of its splendidly-arching fronds, produced from a wiry rhizome (prostrate stem), which has a peculiar dislike to being left underground, often measuring 1¼ft. in length and 5in. in breadth. These fronds are tripinnatifid (three times divided nearly to the midrib) and borne on strong, wiry stalks 2in. to 4in. long, densely clothed with stiff hairs of a rusty-brown colour. The lower leaflets, 2in. to 3in. long, are divided on both sides nearly to the midrib into several pinnules (leafits), which are again pinnatifid, with divided lower and entire narrow upper segments. The sori, six to twenty to a leaflet, and terminal on the lateral segments on both sides, are provided with a small involucre (covering) that is divided nearly to the base and has valves toothed at their summit. The fronds are of a dark, dull green colour, which, however, makes a very pleasing contrast with that of the rusty-brown, bristly hairs which densely cover the rough, round stalks on which they are borne ; the latter character causes this plant to form a link between the species with smooth fronds and the truly hirsute ones.—*Hooker, Species Filicum*, i., p. 110. *Nicholson, Dictionary of Gardening*, ii., p. 167. *Lowe, New and Rare Ferns*, p. 180.

This handsome plant is particularly averse to being wetted overhead, although it requires an abundance of moisture at the roots. A somewhat airy place in the house suits it best.

H. sericeum—se-ric′-ĕ-um (silky), *Swartz.*

This species, native of Tropical America, from Cuba, Jamaica, and Mexico southward to Peru and Brazil, is undoubtedly one of the most remarkable of the hairy kinds in cultivation, for its splendid fronds are produced in such abundance from thin, woolly rhizomes (prostrate stems) as to quite cover the

shady rocks upon which, in a natural state, it grows apace. These fronds, which vary from 6in. to 2ft. in length and from 2in. to 3in. in breadth, are borne on wiry, naked stalks 2in. to 4in. long. They are thus exceptionally long and comparatively narrow, simply pinnatifid (only once divided nearly to the midrib), and of a pendulous habit; they are rendered very attractive by their leaflets, which are sometimes simply notched and sometimes divided more than half-way to the midrib, being covered with a tawny and dense silky down, which in its young stage is of a peculiarly light or silvery hue. The very numerous small sori (spore masses) are terminal on the edge of the leaflets, and are provided with a small, roundish involucre (covering), the base of which is sunk in the leaflet, and which has rounded valves covered with shaggy, reddish-brown hairs.—*Hooker*, *Species Filicum*, i., p. 92. *Nicholson*, *Dictionary of Gardening*, ii., p. 167. *Lowe*, *Ferns British and Exotic*, viii., t. 8B.

Although requiring a great amount of moisture in the atmosphere, this extremely beautiful species is particularly averse to having its long, flexuose, woolly fronds wetted. The material most suitable to its growth is a piece of sandstone, or any other porous stone over which its tiny rhizomes can run freely without, however, clinging to it.

H. Simonsianum—Sim-ons-ĭ-a′-num (Simons'), *Hooker*.

A small-growing species, native of the Khasya Hills and Sikkim, with narrow-oblong fronds 2in. to 3in. long, about ¾in. broad, and borne on slender, naked stalks 1in. to 2in. long and of a wiry nature. These fronds are only once divided nearly down to a broadly-winged rachis (stalk of the leafy portion) into fan-shaped segments with shallow divisions. The sori (spore masses), terminal on the upper parts of these divisions, are provided with a broadly-oblong involucre (covering) that is divided nearly to the base and has toothed valves.—*Hooker*, *Second Century of Ferns*, t. 13. *Beddome*, *Ferns of British India*, t. 281.

H. Smithii—Smith-ĭ-i (Smith's), *Hooker*.

This species, which is the *Leptocionium affine*, *L. holochilum*, *L. Preslii*, and *L. serrulatum*, of Van den Bosch, the principal, or at any rate the most copious, recent writer on *Trichomanes* and *Hymenophyllum*, is a native of

Java, the Philippine Islands, and the Malayan Peninsula. Its oblong, sharp-pointed fronds, 3in. to 8in. long, 2in. to 3in. broad, and borne on wiry stalks 1in. to 2in. long, of a naked or slightly downy nature, are bipinnatifid (twice divided nearly to the midrib). The rachis (stalk of the leafy portion) is winged above and ciliated (hairy) below, and the oblong-triangular leaflets have their own rachis winged and are divided into narrow and peculiarly-toothed segments, one to four times forked. The sori (spore masses), one to four to a leaflet, are terminal on the segments on both sides, and are provided with a small involucre (covering) that is oblong in form and divided about half-way down, having entire valves. — *Hooker*, *Species Filicum*, i., p. 97, t. 35B. *Beddome*, *Ferns of British India*, t. 277.

H. Sprucei—Spru′-cĕ-i (Spruce's), *Baker.*

A pretty, small-growing species, native of Tarapota, Eastern Peru, and one which in habit resembles the small forms of *H. interruptum*, but with fronds of a much thinner texture and the hairs confined to the ribs and edges.—*Hooker*, *Synopsis Filicum*, p. 65.

H. tasmanicum—tas-man′-ic-um (Tasmanian). This is identical with *H. javanicum.*

H. tenellum—ten-el′-lum (slender), *Kuhn.*

A stove species, of small dimensions, native of Ceylon and the Mascarene Islands, with wide-creeping rhizomes (prostrate stems), from which broadly-triangular fronds, 1in. to 2in. long, ¾in. to 1in. broad, and three times divided to the midrib, are produced in abundance. The main stalk is winged down to the base, and the triangular leaflets are wedge-shaped at the base on the lower side. The sori (spore masses), two to six to a leaflet, are terminal; they are provided with round lobes and a wedge-shaped, entire base.—*Hooker*, *Synopsis Filicum*, p. 57.

H. tenerrimum—ten-er′-rim-um (most tender), *Van den Bosch.*

This little plant, native of Peru, is much the most slender and diminutive species of the section comprising *H. falklandicum*, *H. tunbridgense*, &c. Its little fronds, 1in. to 2in. long and less than ½in. broad, are pinnate (once divided to the midrib), with leaflets distant, very small and slender, simple

or once or twice forked. The spore masses, solitary or two together, are terminal, and provided with an involucre (covering) that is divided nearly to the base, and has round, ciliated valves.—*Hooker*, *Synopsis Filicum*, i., p. 68.

H. tortuosum—tor-tŭ-o′-sum (zigzag), *Hooker and Greville.*

A pretty species, of medium growth, native of Chili, Patagonia, and the neighbouring islands. Its broadly-triangular fronds, 3in. to 6in. long and 2in. to 3in. broad at their base, are borne on erect stalks 2in. to 3in. long, of a wiry nature, and furnished on both sides with a narrow, crisped, sinuated (wavy) wing, equally noticeable along the rachis (stalk of the leafy portion). They are three times divided to the midrib, the ultimate divisions being long and narrow, irregularly toothed, and undulated at the margin. The sori (spore masses), sometimes ten to twenty to a leaflet, are stalkless and terminal on the ultimate segments, and are provided with a broadly-egg-shaped involucre (covering) that is divided about half-way down, the valves being slightly toothed on the outer edge.—*Hooker*, *Species Filicum*, i., p. 99. *Hooker and Greville*, *Icones Filicum*, t. 129.

H. triangulare—trĭ-ang-ul-a′-rĕ (triangular), *Baker.*

A small-growing and prettily-divided species, native of Fernando Po, and one which in habit greatly resembles *H. bivalve* and *H. multifidum*, but with broader segments, and sori (spore masses) also much larger and usually solitary.—*Hooker*, *Synopsis Filicum*, p. 69.

H. tunbridgense—tun-bridg-en′-sĕ (from Tunbridge), *Smith.*

Though one of the smallest-growing, the "Tunbridge Wells Filmy Fern," as this species is popularly called, is also one of the most interesting plants in cultivation, and possesses additional attraction from being an eminently British Hymenophyllum. It was first discovered by Mr. Dare, a botanist of the seventeenth century, and was first mentioned by Petiver in his "Musei Petiverani Centuria Prima," published in 1695. Mr. Petiver there calls it *Darea tunbridgensis minor*, thus commemorating the finder and the place where it was found. We find it stated in Ray's "Synopsis Methodica Stirpium Britannicarum," published in 1696, that "this Fern was first shown to Mr. Ray by Mr. Newton, who, in company with Mr. Lawson, found

it on Buzzardrough Cragg, near Wrenose, Westmoreland, among the moss. Dr. Richardson met with it upon moist rocks in Wales, and near Settle, in Yorkshire. It was found also plentifully by Mr. Rand, in company with Mr. Sherrard, among the pebbles of Cockbush, six or seven miles from Chichester, on the coast of Sussex." Although very scarce at Tunbridge Wells now, it was formerly plentiful there, as well as in Devonshire, at Westman's Wood, Becky Falls, Durnsford Bridge, and other places; then in Yorkshire, although not very frequently, it used to occur at Greenfield, near Saddleworth, and near Halifax. It is to the present day found in abundance in Ireland, near the upper Lake of Killarney, and in the County of Wicklow, at Powerscourt Waterfall, Glencree, &c.; in Wales, near Cader Idris and Dolgelly; while in Scotland it occurs frequently, especially in the vicinity of Oban.

But it is not only in the British Isles that *H. tunbridgense* is indigenous, for it is of a very cosmopolitan habit, being often imported from Madeira and the Azores, where it frequently covers the short trunks of *Dicksonia* (*Balantium*) *culcita*. It is reported from the Mauritius, Jamaica, Venezuela, Guatemala, and the Peruvian Andes; it has also been found in Ceylon, on the Himalayas, and Beddome states, "I have also detected this species on the mountains close to Chokampatly (Tinnevelly) at an elevation of 5000ft., and lately it has been discovered in great quantities in Japan." In its natural habitats, the Tunbridge Wells Filmy Fern grows from the sea-level to the height of 1200ft., and delights in a warm, damp, sheltered situation; although it thrives in various positions, it prefers one approaching the perpendicular, and is often found growing on trees.

Fig. 84. Hymenophyllum tunbridgense (nat. size).

H. tunbridgense is a compact, elegant little plant (Fig. 84), with tiny, thread-like rhizomes (prostrate stems) of a very wiry nature, producing little fronds, oblong-spear-shaped, 1in. to 3in. long, ½in. to 1in. broad, and

furnished with flabellato-pinnatifid pinnæ (leaflets somewhat fan-shaped and divided nearly to the midrib on their upper side). The sori (spore masses), which are stalkless and usually solitary in the axils of the narrow segments, are provided with a nearly round, two-valved involucre (covering) that is copiously toothed on the upper margin.—*Hooker*, *Species Filicum*, i., p. 95. *Lowe*, *Ferns British and Exotic*, viii., t. 5B; *Our Native Ferns*, ii., t. 72. *Beddome*, *Ferns of Southern India*, t. 265.

However spreading and flourishing we meet with the Tunbridge Wells Filmy Fern in its native state, often covering large surfaces of rock and stone exposed to the action of all kinds of weather, we find, when an attempt at cultivation is made, that it is one of the most difficult of all Hymenophyllums to manage. It dislikes water over the fronds, and thrives well either in a mixture of equal parts of peat and silver sand or on a block of sandstone, the principal object being to have it pressed hard on to the material upon which it is intended to grow. Dr. John Winter, of Brighton, a most successful cultivator of these plants, says that the treatment which gives the most satisfactory results consists in laying the sheet of *Hymenophyllum* upon a porous piece of stone without any soil, and laying a slab over it, leaving it in that state for three to four weeks, after which time the plant has usually taken hold of the new stone, when the slab is removed.

H. undulatum—un-dul-a′-tum (wavy), *Smith.*

A pretty species, native of Mexico, Jamaica, and Peru, with narrow-oblong, pendent fronds of a flaccid nature, 3in. to 6in. long, scarcely 1in. broad, three times divided nearly to the midrib, and borne on very slender stalks 1in. to 2in. long. The sori (spore masses), two to six to a leaflet, are provided with an involucre (covering) that is divided nearly to the base and has rounded valves slightly crisped towards the margin, but not toothed.—*Hooker*, *Species Filicum*, i., p. 105.

H. unilaterale—u-nil-at-er-a′-lĕ (one-sided), *Bory.*

Although closely related to *H. tunbridgense*, this plant, popularly known as "Wilson's Filmy Fern," is sufficiently distinct to be separated from that species. It is equally of a cosmopolitan character, being found in a natural state in Norway, in South Africa, in the Falkland Islands, in Tasmania and

New Zealand, in Chiloe, &c. It is also more widely spread throughout England, Scotland, Ireland, and Wales than *H. tunbridgense*. In Wales it is met with on Snowdon, near Llanberis Pass, and on the adjacent mountains, especially near Twll-du and on rocks near Pont Bren over a gulf of the River Rheidol. In Ireland it is found in most counties, but principally in Killarney, on the Kerry mountains, and in Connemara. In Scotland its distribution is very wide in Ayr, Peebles, Stirling, Forfar, Perth, Argyle, Ross, &c., but it is commoner in Argyleshire and at Finlarig Burn, near Killin, in Perthshire, than in any other localities. Its presence in England is recorded from various counties, among which we note Cornwall, Devon, Stafford, Salop, Lancashire, Yorkshire, Northumberland, Westmoreland, Cumberland, &c., the principal localities where it has been gathered being near the waterfall at Ambleside; at Black Rocks of Great End, in the Scawfell Range, and at Scale Force Fall, near Buttermere; at Greenfield, near Saddleworth, and near Silverdale.

Fig. 85. Hymenophyllum unilaterale, showing Habit, and Detached Pinnule with Involucre
(Habit, nat. size; detached Pinnule enlarged).

H. unilaterale is altogether of more rigid habit than *H. tunbridgense*, from which it is also distinguished by its leaflets, of a very dark colour though remarkably transparent, being curved and repeatedly divided, but not fan-shaped (Fig. 85). The stalks of the fronds are round and almost black, and the sori (spore masses), disposed in the axils of the leaflets, instead of being stalkless as in *H. tunbridgense*, are distinctly though shortly stalked. Another peculiarity of this little plant is the repeated elongation of its fronds, which not only endure for several years but renew their growth annually—a circumstance first pointed out by Mr. F. Clowes, of Windermere. It succeeds well under the treatment recommended for *H. tunbridgense*. *H. Wilsoni* of Hooker is identical with this species.—*Hooker*, *Synopsis Filicum*, p. 67. *Nicholson*, *Dictionary of Gardening*, ii., p. 167. *Lowe*, *Our Native Ferns*, ii., t. 73.

H. valvatum—val-va′-tum (valvate, having folding parts), *Hooker and Greville.*

This charming species, distinct in habit from all others, is a native of Nicaragua, Guadeloupe, Martinique, and the Andes of Columbia and Peru, where it grows on trunks of trees, sometimes entirely covering them. Its broadly-triangular fronds, of an exceptionally dark green colour, 4in. to 6in. long, and 1½in. to 2½in. broad at the base, are produced from exceedingly slender rhizomes (prostrate stems) of a wiry nature, 1in. to 3in. long, slightly winged above. They are tripinnatifid (three times divided nearly to the midrib), with their rachis (stalk of the leafy portion) winged throughout and their leaflets slightly hairy, the lower ones being triangular, with deeply-cleft pinnules (leafits). The ultimate segments are conspicuously waved on each side of the midrib. The sori (spore masses), twelve to twenty to a leaflet, are terminal on the segments of the upper ones on both sides; they are provided with an egg-shaped involucre (covering) that is divided nearly to the base, the valves being smooth or slightly ciliated.—*Hooker and Greville*, *Icones Filicum*, t. 219. *Lowe*, *New and Rare Ferns*, Addenda, p. 182.

The growth of this species is peculiar, as it takes place in autumn and winter, when most other Ferns from the same habitats are comparatively resting. Although not of a hirsute nature, it greatly dislikes water on its delicate and exceedingly transparent fronds.

H. Wilsoni—Wil′-son-i (Wilson's). Synonymous with *H. unilaterale.*

H. Zollingerianum—Zol-lin-ger-ĭ-a′-num (Zollinger's), *Kunze.*

A species of medium dimensions, native of Java, and in habit somewhat resembling *H. polyanthos*, from which it differs principally through the apex of its flaccid fronds being elongated.—*Hooker*, *Synopsis Filicum*, p. 62.

CHAPTER XXVII.

HYPODERRIS, *Brown.*

(Hyp-od-er′-ris.)

OF this genus only two species are known; they are closely allied to *Woodsia*, but may be distinguished at first sight by their comparatively large size and robust habit, and botanically by their having a conspicuously-reticulated venation. In Hooker's "Synopsis Filicum" *Hypoderris* forms Genus 10, and is placed between *Onoclea* and *Woodsia*. The name is derived from *hypo*, under, and *derris*, skin, in reference to the indusium (covering of the sporangia), a portion of which is buried under the sori (spore masses). The fronds, produced from a short rhizome (prostrate stem) of a woody nature, are either undivided or three-lobed. The sub-globose sori are disposed in lines or series parallel with the secondary veins, and usually scattered over the whole surface of the under-side of the fronds; they are furnished with a membranous, parchment-like involucre in the form of a calyx and fringed on the margin.

Culture.

The Hypoderrises are Ferns of easy culture, thriving well in a warm temperature and moist atmosphere. The compost which they prefer consists of one part of fibrous loam, two of peat or partly-decayed leaf-mould, and one of silver sand; and although attaining larger dimensions when grown

in a shady place, they thrive luxuriantly in and are not averse to strong light. They also enjoy an abundance of water at the roots, especially from May to October. On account of their robust habit, these Ferns are well adapted for the decoration of the warm rockery where their foliage, of a massive nature, forms a striking contrast with that of plants with more finely-divided fronds.

Species.

H. Brownii—Brown′-ĭ-i (Brown's), *J. Smith.*

This singular, handsome, and strikingly-distinct Fern, native of Trinidad and Guiana, is little known in cultivation in this country. It is an evergreen,

Fig. 86. Frond of Hypoderris Brownii
(½ nat. size).

stove species, producing from a short-creeping and scaly rhizome (prostrate stem) of a woody nature fronds of a light green colour, borne on stout stalks densely covered with diminutive, whitish scales. The leafy portion of the fronds is either undivided or three-lobed (Fig. 86) when mature, and the lateral lobes

Nephrolepis Duffii, showing Habit of Plant and Terminal Portion of detached Frond

(Habit, ⅛ nat. size; Portion of Frond, nat. size).

are then very small in comparison with the central one. The whole frond, 10in. to 12in. long, is somewhat undulated, with a cordate (heart-shaped) base, and its margin is entire. The abundant spores germinate very freely.—*Hooker*, *Garden Ferns*, t. 24. *Lowe*, *Ferns British and Exotic*, vii., t. 14.

H. Seemanni—See-man′-ni (Seemann's), *Prentice.*

A handsome, strong-growing species, native of Nicaragua, with oblong-spear-shaped fronds 1½ft. long and 6in. to 7in. broad, produced from a short, woody rhizome (prostrate stem), and borne on fleshy stalks 6in. to 12in. long with only a few scales at the base. These fronds are pinnatifid (divided nearly to a narrowly-winged midrib) in their lower part, ligulate (strap-shaped) and sinuated (waved) in their upper third. The pinnæ (leaflets) are spear-shaped, few, and distant ; their texture is parchment-like and they are smooth on both sides. The sori (spore masses) are scattered in an irregular line, principally near the edge of the leaflets.—*Hooker*, *Synopsis Filicum*, p. 460.

CHAPTER XXVIII.

HYPOLEPIS, *Bernhardi.*

(Hyp-ol′-ep-is.)

ALTHOUGH Hooker, in his "Species Filicum," enumerates some thirty species, Presl, in his "Tantamen Pteridographiæ," describes ten species, and Fée, in his "Genres de la Famille des Polypodiacées," gives over twenty species, this genus, closely allied to *Cheilanthes*, as it is accepted now, comprises only about a dozen species of Ferns of medium and large dimensions, all furnished with creeping rhizomes (decumbent stems). It derives its name from *hypo*, under, and *lepis*, a scale, in allusion to the marginal covering peculiar to the inferior sporange (lower spore capsule), and in Hooker's "Synopsis Filicum" forms Genus 24. The distinctive characters of the plants which have been retained in this genus reside in the non-confluent nature of their uniform, roundish, marginal, small sori (spore masses) and in their invariably being placed in the sinuses (notches) of the ultimate divisions of the frond; also in the involucre, of the same shape as the sorus which it covers, being membranous in texture and formed out of the reflexed margin.

Culture.

All the known species of *Hypolepis* are indigenous in either warm or temperate climates—Tropical America and the West Indies as well as New Zealand, Cape Colony, and California: the genus has no British representative,

and all the species require either stove or greenhouse temperature. They are highly ornamental when planted in the rockery, for which purpose they are most useful, as they thrive best when associated with stones, over and amongst which their creeping rhizomes (prostrate stems) delight to run, although they do not cling to the stones. All are of easy culture, and when kept in pots should be grown in rough peat with a good sprinkling of small stones and silver sand, as they require an abundant supply of water at the roots at all times of the year. On that account also it is indispensable that the drainage of either the pots or the part of the rockery in which they are planted should be perfect, any deficiency in this respect producing most disastrous results. Hypolepises should be grown in a fairly shaded position, as the rays of the sun are hurtful to their foliage, which in most instances is of a soft, papery texture.

All the species of this genus may be propagated from spores, which in most cases vegetate freely; but they are usually increased by the division of their rhizomes, this being a quicker and less troublesome mode of reproduction.

Principal Species and Varieties.

H. amaurorachis—am-aur-or′-ach-is (having a dark rachis), *Kunze.*

This highly ornamental, greenhouse species, very distinct from any other in cultivation, is a native of Australia. Its remarkably handsome fronds, of a soft, papery texture, light, cheerful green in colour, and of a very hairy nature on both surfaces, are produced in great abundance from thick, hairy rhizomes (prostrate stems), and are of an elegant, elongated-triangular shape. They are about 3ft. long and 2ft. broad at the base, and are borne on sturdy stalks 1ft. to 1½ft. long, which, like the rachis (stalk of the leafy portion), are of a dark purplish colour, rough and very hairy; they are three or four times divided nearly to the midrib towards the base, being less divided towards the summit. The pinnæ (leaflets) are distinctly petiolate (stalked), those at the base being opposite, the others alternate; their pinnules (leafits) or sub-divisions are undulated and notched. The abundant and conspicuous sori (spore masses) are situated singly in the notches of the lobes and disposed on their margin.—*Lowe, New and Rare Ferns*, t. 2.

This is a plant very easily managed, and one which with ordinary care readily makes a pretty specimen, as the fast-creeping rhizomes soon spread in all directions.

H. anthriscifolia—an-thris′-cif-ol′-ĭ-a (Chervil-leaved), *Presl.*

A very robust-growing, greenhouse species, native of Bourbon, Mauritius, and Fernando Po, with ample fronds of a thin, papery texture, which are said by Bojer to attain 18ft. in length (?). The fronds are quadripinnatifid (four times divided nearly to the midrib) and borne on strong, erect, straw-coloured stalks 1ft. to 2ft. long, rather rough with small raised points; their lower leaflets, 1ft. or more in length and 4in. to 6in. in breadth, are divided into spear-shaped, distantly-placed pinnules (leafits), the segments of which are cut down to the midrib into small, oblong, deeply-pinnatifid divisions, in the lower sinuses (notches) of which the spore masses are disposed two to four together (Fig. 87).—*Hooker, Species Filicum*, ii., p. 66, t. 95A.

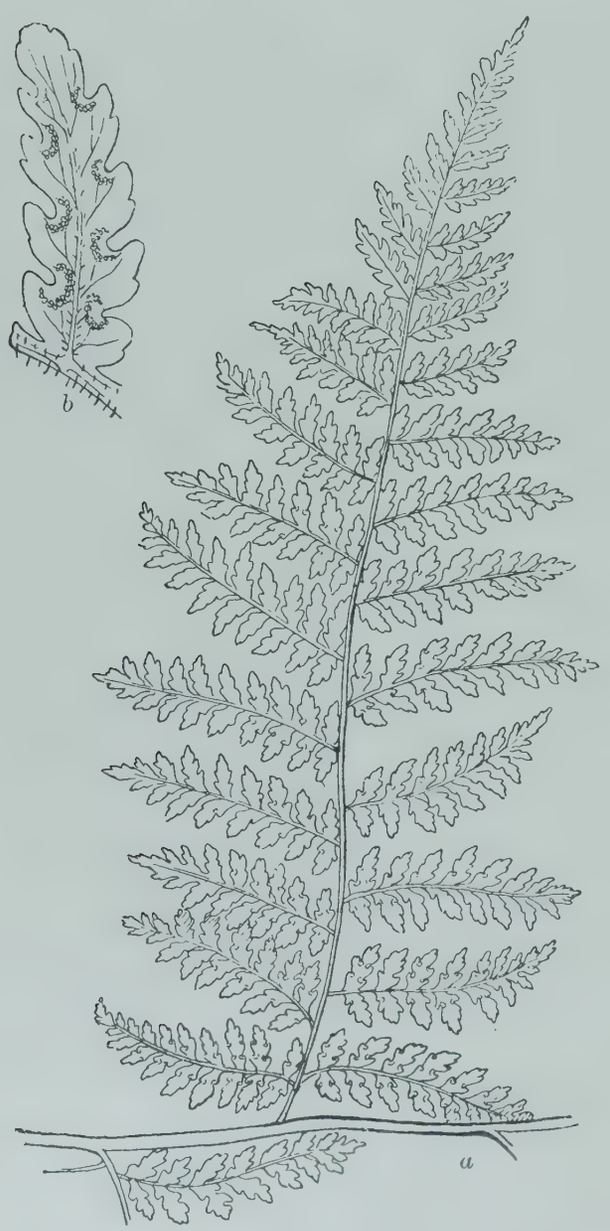


Fig. 87. Pinna and Pinnule of Hypolepis anthriscifolia (*a*, Pinna, ⅛ nat. size; *b*, Pinnule, nat. size).

The above-described plant bears no resemblance to the one which is extensively found in gardens under the name of *H. anthriscifolia*, for which we have been unable to find any authority. The garden plant variously known as *Hypolepis*, *Cheilanthes*, and *Microlepia anthriscifolia*, is a charming Fern of dwarf dimensions, said to be native of South Africa. It is of a deciduous nature (losing its fronds in the winter), and quite peculiar in growth, its beautiful fronds, which are four times divided nearly to the midrib,

resembling in their numerous and finely-cut divisions those of a common "Lace Fern" (*Cheilanthes elegans*); they are abundantly produced from strictly underground rhizomes (stems), which are small and of wiry texture. These fronds, which grow almost upright, seldom measure more than 6in. to 7in. in length, and their breadth varies from 2½in. to 3in. at their widest part; they are of a soft green colour when young, turning with age to a darker green tint and a velvety texture; and being borne on slender and slightly hairy, short stalks, a delightful effect is imparted. This plant possesses the advantage of being perfectly hardy. In Messrs. Backhouse's nursery, at York, it has stood uninjured for several winters on the outdoor rockery. Being of small dimensions, and a capital grower, it may with advantage be used for making edgings in the cool Fernery under glass. It is also well adapted for growing in hanging baskets of small dimensions; but care must be taken not to allow it to get dry during the winter season, as its slender rhizomes soon lose their vitality when the soil surrounding them lacks moisture for any length of time.

H. Bergiana—Berg-ĭ-a′-na (Berg's), *Hooker.*

This well-marked, greenhouse species is a native of South Africa, being found in Cape Colony, Kaffraria, Natal, and Gambosi Land, and one of the handsomest of its section. Its beautiful fronds, triangular in shape and quadripinnatifid (four times divided nearly to the midrib), are of a peculiarly upright habit; they are from 1ft. to 1½ft. long, 6in. to 9in. broad, and borne on strong, tufted, upright stalks 1½ft. to 2ft. long, dark chestnut-brown in colour, and woolly throughout. The leaflets are also triangular, and their pinnules (leaflts), of a similar shape, are further divided into egg-shaped segments ½in. to ¾in. long and ¼in. to ½in. broad, with oblong, bluntly-toothed ultimate divisions, which give the plant a very elegant appearance. The leafy portion of the fronds is of a peculiarly thin, papery texture, and bright shining green in colour, and the rachis (stalk of the leafy portion) is of a rigid nature, zigzag, dark brown, and woolly. The under-surface of the frond is hairy throughout. The very small sori (spore masses), produced in great abundance, are placed in the sides of the lobes of the segments or ultimate divisions.—*Hooker, Species Filicum*, ii., p. 67. *Nicholson, Dictionary of Gardening*, ii., p. 170.

H. Bergiana is singularly prolific, and the way in which it reproduces itself most readily is very peculiar, and confined to this species: from its tiny fibrous roots spring a quantity of small, seedling-like plants, which form good-sized subjects much more quickly than seedlings proper.

H. californica—cal-if-or′-nic-a (Californian), *Hooker.*

This species, also named *Aspidotis californica*, and which has quite the habit of the more finely-divided coriaceous species of *Cheilanthes*, is identical with *Cheilanthes californica* of Mettenius.

H. distans—dis′-tans (distant), *Hooker.*

This pretty, greenhouse species, native of New Zealand, in its very graceful habit resembles some slender forms of *Asplenium* (*Athyrium*) *Filix-fœmina*, and is particularly well adapted for growing in a Fern-case, where its elegant foliage develops itself to perfection. The fronds, abundantly produced from slender, creeping rhizomes (prostrate stems), and borne on slender, flexuose (zigzag-bending) stalks about 6in. high, of a chestnut-brown colour and slightly rough, are about 1ft. long, 4in. to 5in. broad, broadly spear-shaped, and bipinnate (twice divided to the midrib). The leaflets spread at right angles with the rachis (stalk of the leafy portion), and their oblong pinnules (leafits) are cut about half-way down; they are of a thin, papery texture and of an intense dark green colour. The sori (spore masses), two to four to a pinnule, are placed in the lower sinuses.—*Hooker*, *Species Filicum*, ii., p. 70, t. 95c. *Nicholson*, *Dictionary of Gardening*, ii., p. 170.

H. hostilis—hos′-til-is (inimical), *Presl.*

A stove species, of large dimensions, native of Jamaica, Cocos Island, and Peru, of more delicate appearance than the popular *H. repens*, with smaller and more deeply-divided ultimate lobes, in which respect, as well as in general habit, it very closely resembles the South African *H. anthriscifolia*. —*Hooker*, *Synopsis Filicum*, p. 130.

H. millefolium—mil-lef-ol′-ĭ-um (Milfoil-leaved), *Hooker.*

This greenhouse species, native of New Zealand, is a much smaller plant than the better-known *H. tenuifolia*. Its broadly-triangular fronds, 1ft. or more long and 4in. to 6in. broad, are borne on erect stalks about 6in. long,

of a pale brown colour, and produced from a stout rhizome (prostrate stem) of a wide-creeping nature; they are of a soft, papery texture, their under-surface being slightly hairy and the stalks of their leaflets slightly winged. The ultimate segments are also more frequently and sharply toothed, and the small, roundish sori (spore masses) are placed in their lower sinuses (notches) only. —*Hooker, Species Filicum*, ii., p. 68, t. 95B.

H. nigrescens—nig-res′-cens (blackish), *Hooker.*

A very robust-growing, stove species, native of Jamaica, Martinique, Venezuela, and the banks of the Amazon. It is distinct from all other known species through the strong prickles with which the stout, erect stalks of its fronds are thickly armed. The fronds themselves, of a soft, papery texture, are ample and quadripinnatifid (four times divided nearly to the midrib); they are furnished with numerous leaflets spreading at right angles from the main rachis (midrib), the lowest being frequently 1ft. long, 6in. broad, and divided into leafits 3in. to 4in. long, 1½in. broad, spear-shaped, spreading or even deflexed (thrown back). The small and numerous sori (spore masses) are placed at the bases of the sinuses (notches) of the ultimate divisions.—*Hooker, Species Filicum*, ii., p. 66, t. 90C.

H. Purdieana—Pur-die-a′-na (Purdie's), *Hooker.*

This stove species, of comparatively small dimensions, is a native of New Granada. Its spear-shaped fronds, 9in. to 12in. long and tripinnatifid (three times divided nearly to the midrib), are borne on strong, erect, rough stalks 6in. to 9in. long, of a bright brown colour. The largest leaflets, 2in. long and 1in. broad, are cut down below to a narrow-winged rachis (midrib) into numerous narrow-oblong and deeply-notched pinnules (leafits); they are of a soft, papery texture, and their rachis is densely clothed with long and narrow scales of a peculiar brown colour. The sori (spore masses), nearly one line across and roundish, are placed against the sinuses of the pinnules (notches of the leafits).—*Hooker, Species Filicum*, ii., p. 69, t. 91B.

H. radiata—rad-ĭ-a′-ta (having radiating leaflets).

The plant frequently found in gardens under this name, for which we can find no authority, is identical with *Cheilanthes radiata*, also popularly known as *Adiantopsis radiata.*

H. repens—re′-pens (creeping), *Presl.*

Although a somewhat coarse-growing Fern, this stove species, native of Tropical America, from the West Indies southward to Brazil and Peru, is a robust, handsome plant, with fronds 3ft. to 4ft. long, quadripinnatifid (four times divided nearly to the midrib), produced from a wide-creeping rhizome (prostrate stem), and borne on strong, upright stalks 1ft. to 2ft. long, straw-coloured, and more or less densely prickly. The lower leaflets (Fig. 88), 1ft. to 2ft. long and 6in. to 12in. broad, are divided into spear-shaped pinnules (leafits) 6in. long, 1½in. to 2in. broad, with oblong-spear-shaped, blunt segments, that are cut down nearly to the midrib into numerous bluntish lobes; they are of a soft, papery texture, and the sori (spore masses), two to six to a segment or lobe, are placed in the sinuses (notches).—*Hooker*, *Species Filicum*, ii., p. 64, t. 90c. *Nicholson*, *Dictionary of Gardening*, ii., p. 170. *Lowe*, *Ferns British and Exotic*, iv., t. 11.

Fig. 88. Pinna of Hypolepis repens (¼ nat. size).

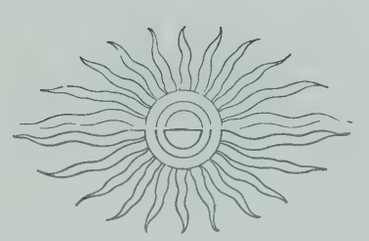
This species seeds so freely that, when once obtained, it is almost impossible to lose it; indeed it becomes a troublesome weed, covering every Fern-pan, to the exclusion of all less robust species.

H. spectabilis — spec-ta′-bil-is (beautiful). Synonymous with *Cheilanthes chlorophylla.*

H. tenuifolia—ten-ŭ-if-ol′-ĭ-a (slender-fronded), *Bernhardi.*

This very handsome and distinct species, of unusually striking habit, is a robust-growing plant of a cheerful bright green colour; on account of its being found in a wild state in Java, the Polynesian Islands, Australia, Norfolk Island, and New Zealand alike, it is of a very accommodating nature, thriving

equally well in the greenhouse or in the stove, although in the latter place it attains larger dimensions. Its ample fronds, 4ft. to 5ft. long and quadri-pinnatifid (four times divided nearly to the midrib), are produced from a stoutish, wide-creeping rhizome (prostrate stem) of a downy or slightly hairy nature, and borne on strong, upright stalks 1ft. long and also slightly hairy. The lower leaflets, usually 1ft. to 1½ft. long and 6in. to 9in. broad, are divided into spear-shaped pinnules (leafits), which in their turn are subdivided into segments of similar shape, cut down to the rachis (stalk of the leafy portion) into numerous narrow-oblong, toothed ultimate divisions. The texture is soft and papery, and the under-surface is sometimes slightly hairy. The sori (spore masses), two to six to an ultimate division, are placed at the sinuses (notches) of the teeth.—*Hooker*, *Species Filicum*, ii., p. 60, tt. 89c and 90a. *Nicholson*, *Dictionary of Gardening*, ii., p. 170.



ISOLOMA—Is-ol-o′-ma. *See* **Lindsaya.**

CHAPTER XXIX.

JAMESONIA, *Hooker and Greville.*

(Jame-so′-nĭ-a.)

THIS genus, named after Dr. William Jameson, Professor of Botany at Quito, is monotypic—that is to say, it contains but one species, which, however, has several varieties. It belongs to the tribe *Grammitideæ*, and in Hooker and Baker's "Synopsis Filicum" forms Genus 49, though by Mettenius it is placed in *Gymnogramme*, to which it is closely allied. The distinctive character of the plants belonging to the genus resides in the sori (spore masses), oblong in shape, being placed on the flabellate (fan-shaped) veins on the back of the pinnæ (leaflets), remote from the edge.

Culture.

J. imbricata and its varieties all succeed well under greenhouse treatment. A compost of an open nature, made of two parts fibrous peat, one part chopped sphagnum, and one part silver sand, suits them best. They require copious watering at the roots, but should not be syringed overhead. Propagation is usually effected by the division of their rhizomes, but they may also be increased by means of the spores, which are abundantly produced, and germinate freely when sown in a warm temperature. Not being of a very decorative character, these plants, though thoroughly distinct, are not extensively found in private collections; their culture being generally limited to botanic gardens.

J. imbricata—im-bric-a′-ta (overlapping), *Hooker and Greville.*

A greenhouse plant, native of the Andes, from New Granada southward to Peru. Its fronds, produced from a creeping, black, tortuose rhizome (twisting prostrate stem) of a woody nature, and borne on wiry, slender, blackish stalks 3in. to 4in. long, are 6in. to 18in. long and simply pinnate (only once divided to the midrib). Their pinnæ (leaflets), closely set and roundish, often spread horizontally and have their edge conspicuously incurved ; they are of a leathery texture, and their rachis (stalk of the leafy portion) and under-surface are slightly hairy.—*Hooker and Greville*, *Icones Filicum*, t. 178.

Among the several varieties of *J. imbricata* the following are the most distinct :

J. i. canescens—can-es′-cens (hoary), *Kunze.*

A plant of stouter habit than the species, the long, silky, yellowish-brown hairs of the upper part of the frond being often so dense that they quite hide the leaflets, which are of a hoary (greyish) colour.—*Hooker*, *Synopsis Filicum*, p. 369.

J. i. Pearcei—Pear′-ce-i (Pearce's), *Baker.*

A native of the Andes of Ecuador, where it is found growing at an elevation of 10,000ft. Its fronds, a little more than 1in. broad, have their pinnæ ¼in. broad, oblong, and densely hairy beneath, and their edges revolute. —*Hooker*, *Synopsis Filicum*, p. 514.

J. i. verticalis—ver-tic-a′-lis (perpendicular), *Kunze.*

A variety with fronds 6in. to 9in. long and ½in. broad, borne on rigid stalks about 1ft. long and of a wiry nature ; their oblong-triangular leaflets are naked, and the tomentum (woolly substance) which covers their rachis is very short.—*Hooker*, *Species Filicum*, v., p. 105.

CHAPTER XXX.

KAULFUSSIA, *Blume.*

(Kaul-fus′-sĭ-a.)

A VERY distinct division of the sub-order *Marattiaceæ*, named in commemoration of Dr. G. F. Kaulfuss, a Professor of Botany at Halle, who died in 1830. It is composed of a single species only, and forms in Hooker and Baker's "Synopsis Filicum" Genus 72. It is distinguished from the closely-allied species by its sporangia (spore capsules), ten to fifteen, being sessile (stalkless) and arranged in concrete, raised, circular masses, which are hollow in the centre, with the oblong apertures in the inner face.

There is in commerce another plant known as *Kaulfussia amelloides*, a name for which we cannot find any authority. It is totally different from the present one, inasmuch as it is a flowering plant of the order *Compositæ*. It is the *Charieis heterophylla* of Cassini, an ornamental hardy annual, native of South Africa.

K. æsculifolia—æs-cul-if-ol′-ĭ-a (Chestnut-leaved), *Blume.*

This very curious plant, described also as *Kaulfussia assamica* by Griffith, has peculiarly-shaped, coarse, trifoliate fronds in the shape of a Chestnut-leaf, with the leaflets sessile (stalkless) and their under-surface, when fertile, copiously furnished with cavities or stomata-like pores, which are probably secretory organs. It is a native of Assam and the Philippine and Malayan Islands, and requires stove treatment. The stalks are 1ft. to 1½ft. long and

auricled (eared) at the base. The central leaflet is from 6in. to 12in. in length and 3in. to 4in. in breadth, is oblong-spoon-shaped, and has nearly entire edges ; the other leaflets, of similar shape, are smaller and often unequal-sided and lobed. The texture is soft and fleshy, and the copious, roundish, non-indusiate sori (naked spore masses) are scattered all over the under-surface of the fronds.—*Hooker and Greville*, *Icones Filicum*, t. 229. *Nicholson*, *Dictionary of Gardening*, ii., p. 217. *Beddome*, *Ferns of British India*, t. 185.

The plant is very easily grown, requiring a substantial mixture of two parts fibrous loam, one part peat, and one part sand, with abundance of water at the roots all the year round. It is usually propagated from spores.

K. assamica—as-sam′-ic-a (native of Assam). A synonym of *K. æsculifolia.*

LACOSTEA—Lac-os′-tĕ-a. *See* **Trichomanes.**

LASTREA—Las′-tre-a. *See* **Nephrodium.**

LECANIUM—Lec-an′-ĭ-um. *See* **Trichomanes.**

LEPICYSTIS—Lep-ic-ys′-tis. *See* **Polypodium.**

LEPTOCIONIUM—Lep-toc-ĭ-on′-ĭ-um. *See* **Hymenophyllum.**

LEPTOGRAMME—Lep-tog-ram′-me. *See* **Gymnogramme.**

LEPTOPTERIS—Lep-top′-ter-is. *See* **Todea.**

LEUCOSTEGIA—Leu-cos-teg′-ĭ-a. *See* **Davallia.**

LINDSÆA—Lind-sæ′-a. *See* **Lindsaya.**

CHAPTER XXXI.

LINDSAYA, *Dryander.*

(Lind-say′-a.)

ALTHOUGH but poorly represented in European gardens, yet this is a somewhat extensive genus, comprising about fifty species of very handsome, stove and greenhouse Ferns, the habitats of which are mainly confined within the tropics. They form a distinct tribe (*Lindsayeæ*, named after Archibald Lindsay, an English botanist of the last century), which is distinguished by the disposition of the sori (spore masses): these are placed in a line at, or very near, the edge of the frond, and are provided with an involucre (covering), the inner valve of which is membranous (parchment-like), the outer (obsolete in *Dictyoxiphium*, the only other genus belonging to the tribe) being formed of the margin of the frond.

In Hooker and Baker's "Synopsis Filicum" *Lindsaya* (commonly called *Lindsæa*) forms Genus 20. Most of the species have one-sided leaflets of a somewhat pellucid (transparent) though leathery texture, approaching in shape a quarter of a circle. Lindsayas are readily distinguished through the sori, marginal or nearly so, being placed at the summit of and uniting two or more veins, and through their being furnished with a double involucre opening outwardly. According to their characters, the plants forming this genus are divided into five distinct sections as follow:

DIELLIA (Dĭ-el′-lĭ-a), *Brackenridge.* In this section, which is almost exclusively composed of species from the Sandwich Islands, the sori, not

quite marginal, are transversely oblong or linear (very narrow); the outer valve of the involucre is membranous and similar in shape to the spore mass which it covers, but the frond on the other side is usually produced beyond them and not altered in texture.

Eulindsaya (Eu-lind-say′-a) (the true Lindsayas), *Dryander.* This is a well-marked section, and by far the largest one of the genus. The plants of which it is formed have their head-quarters in Tropical America, Asia, and Polynesia; their distribution, however, extends to the Mauritius, Japan, and Australia. Their habit is very similar to that of certain Adiantums, and their fronds are sometimes pellucid.

Isoloma (Is-ol-o′-ma), *J. Smith.* In habit and texture the plants of which this group is composed resemble *Pteris* rather than *Adiantum*, and the cuneate (wedge-shaped) species appear to be very closely related to *Stenoloma*, of Fée, which forms a sub-division of the genus *Davallia.* The fronds of certain species are simple (undivided), while those of others are either pinnate (once divided to the midrib) or bi- or tripinnatifid (twice or three times divided nearly to the midrib), with their ultimate divisions conspicuously wedge-shaped.

Schizoloma (Schiz-ol-o′-ma), *Gaudichaud.* The fronds of the species belonging to this section are either undivided or simply pinnate (only once divided to the midrib) and not transparent. They also have their veins more or less anastomosing (running into one another).

Synaphlebium (Syn-aph-leb′-ĭ-um), *J. Smith.* In habit and texture, the plants of this section greatly resemble Eulindsayas, from which they differ only by the anastomosing nature of the veins of their leaflets, which are unilateral (disposed along one side of the frond).

Culture.

If the species of this genus are more extensively represented in herbaria than in gardens, it is not on account of their deficiency in good qualities, but simply owing to the difficulties with which their importation is usually beset. Time after time, some of the most beautiful representatives of the genus have arrived in Europe; but, although to all appearances in good condition on their arrival, from some inexplicable cause they have just as

frequently died, leaving nothing behind but dry specimens for the herbarium. Lately, however, owing to their being differently treated, some of the most interesting kinds, looked upon as precious gems by all Fern-lovers, have been established in this country. These, when taken from the packing-cases, were placed in pots nearly filled with crocks, in which they were firmly held by two or three pieces of turfy loam. In this way cultivators are imitating their natural mode of growth, for this class of Fern is generally found with the creeping rhizomes (prostrate stems) running in and about a poor stony soil, frequently drenched with rain, and therefore often carried away and leaving very little soil to stagnate about the roots. All of them, too, revel in a humid atmosphere, and under cultivation do well if treated as Filmy Ferns; but they need a higher temperature. Several of the species bear considerable resemblance to certain Adiantums, some others are more like Davallias but in all instances their stalks, which are light-coloured, lack the black, polished appearance peculiar to those of most of the Maidenhair Ferns.

Although they require an abundance of water at the roots, perfect drainage for Lindsayas cannot be too strongly insisted upon, for they suffer considerably from the effects of stagnant water—as much, in fact, as from the want of atmospheric humidity. When properly established, these plants should be potted in a mixture of two parts turfy loam and one part fibrous peat, with just a dash of sand; and only a little of this mixture should be used in each pot, the greater part of which should be filled with drainage materials. They should then be either set on, or, better still, plunged in, a bed of sphagnum moss, kept close, and occasionally sprinkled overhead. Nearly all the species thrive fairly well under such treatment, although a few members of the genus, notably those native of New Zealand, such as *L. linearis*, *L. microphylla*, and *L. trichomanoides*, naturally need a little less heat. The majority of them, however, come from warmer climes—the East and the West Indies, Tropical America, &c.—where they grow naturally either in or on the margin of the woods and under the shade of large forest trees, close to running streams, where the atmosphere is constantly humid and warm. With the few exceptions indicated, all the species here described require stove temperature.

Lindsayas are usually propagated by the division of their crowns or of their rhizomes. We have no record of any of them having been raised from

Davallia tenuifolia Veitchiana
(¼ nat. size).

spores in this country, unless it be of *L. retusa* of Mettenius, which has been fully described as *Davallia retusa*, the name first given to it by Cavanilles, subsequently confirmed by T. Moore, and under which the plant is also extensively known in European gardens.

Principal Species and Varieties.

L. adiantoides—ad-ĭ-ant-ŏ-i′-dēs (Adiantum-like), *J. Smith.*

A species of medium or small dimensions, also known as *L. humilis*, native of the Malayan Archipelago. Its elegant fronds, 4in. to 6in. long, 1in. broad, and simply pinnate (only once divided to the midrib), are borne on somewhat tufted, black, polished stalks 1in. to 2in. long and of a wiry nature. The leaflets, of a soft, papery, and somewhat transparent texture, are about ½in. long and ¼in. broad, with the upper edge rounded and broadly lobed about one-third of the way down, and the lower one straight or slightly curved. The sori (spore masses) are marginal in the lobes.—*Hooker*, *Species Filicum*, i., p. 204, t. 61c. *Nicholson*, *Dictionary of Gardening*, ii., p. 280.

L. borneensis—bor-ne-en′-sis (Bornean), *Hooker.*

This species, with short-creeping rhizome and fronds 1ft. to 1½ft. long and 9in. to 12in. broad, is a native of the forests of Borneo. It comes very near the better-known *L. guianensis*, but its sori are quite marginal and disposed in a continuous line.—*Hooker*, *Synopsis Filicum*, p. 107.

L. botrychioides—bot-rych-ĭ-ŏ-i′-dēs (Botrychium-like), *St. Hilaire.*

A Brazilian Fern, which it is suggested may be simply a loose, unbranched variety of *L. guianensis*, but smaller in all respects, and with fronds simply pinnate (only once divided to the midrib). The sori (spore masses) are disposed in a continuous line round the upper and outer edge and the inner half of the lower one, the outer valve projecting beyond the inner one.—*Hooker*, *Synopsis Filicum*, p. 105.

L. Catherinæ—Cath-er-i′-næ (from St. Catherine's), *Hooker.*

Although Hooker, in his "Species Filicum" (p. 212, vol. i.), minutely describes as a species and gives an illustration (t. 65B) of this Brazilian

plant, it is now recognised as simply a variety of *L. virescens.*—*Hooker*, *Synopsis Filicum*, p. 106.

L. caudata—cau-da′-ta (tailed). A variety of *L. trapeziformis.*

L. concinna—con-cin′-na (neat), *J. Smith.*

A pretty species, native of the Philippine Islands and Borneo. Its fronds, 6in. to 12in. long, ¾in. broad, and simply pinnate (only once divided to the midrib), are produced from a short-creeping rhizome (prostrate stem) and borne on erect stalks 2in. to 4in. long and of a wiry nature. The leaflets, which are of a soft, papery, and somewhat transparent texture, are very blunt on the outer edge, and the upper ones are very closely set together, but not overlapping. The sori (spore masses) are disposed in a continuous or somewhat interrupted line along the upper edge, which is slightly notched. —*Hooker*, *Species Filicum*, i., p. 205, t. 61B.

L. (Schizoloma) cordata — Schiz-ol-o′-ma ; cor-da′-ta (heart-shaped), *Gaudichaud.*

This species, of very peculiar appearance and dwarf habit, native of the Malayan Peninsula, where it is said to be rare, is totally distinct from all the other members of the genus, inasmuch as the fertile and the barren fronds are completely dissimilar in every respect. The fertile ones, which rise altogether above the others, measure from 3in. to 6in. in length ; they are usually linear (very narrow), entire or forked, or sometimes divided into three long, narrow leaflets, on which the sori (spore masses) are disposed in a continuous, marginal line. The barren fronds, on the contrary, are quite entire (undivided), somewhat heart-shaped, 2in. to 3in. long, and 1in. to 1½in. broad. Both kinds are of a leathery texture, are produced from a short-creeping rhizome (prostrate stem), and are borne on slender, erect, wiry stalks, which are longer in the fertile than in the barren ones.—*Hooker*, *Species Filicum*, i., p. 219, t. 66A. *Beddome*, *Ferns of British India*, t. 299.

L. cultrata—cul-tra′-ta (shaped like a plough-coulter), *Swartz.*

A very elegant species, also known in gardens as *L. Lobbiana*, native of the East Indies, Java, Ceylon, Luzon, and the Philippine Islands ; in the Himalayas it ascends to 4000ft. ; it has also been found in the Neilgherries

and in Queensland. It is a distinct, Adiantum-like Fern, of a hardier constitution than most other kinds. *L. cultrata* is a thoroughly evergreen species, which, if a tolerably fair quantity of humidity is kept up in the stove Fernery, will soon make itself at home there, especially if it can be planted on rockwork by the water's edge. It is of itself very interesting and ornamental, but its attractive powers are still further enhanced by the delicious perfume emitted from its foliage, which somewhat resembles that of almonds or that produced by the Peach-tree leaf on being crushed between the fingers, and we have heard it compared to the odour of the Sweet-scented Vernal Grass (*Anthoxanthum odoratum*). Its perfume, whatever it is compared to, is retained for several years when the fronds are kept in a dry state. The fronds are freely produced from a short-creeping, underground rhizome (prostrate stem), and borne on wiry, green stalks 3in. to 6in. long; they are simply pinnate (only once divided to the midrib), 6in. to 12in. long, and about 1in. broad. The leaflets are either opposite or alternate, ½in. to ¾in. long, about ¼in. broad, closely set but not imbricated (overlapping); they are of a somewhat leathery texture and bright green colour, and their lower margin is straight or slightly curved, usually upwards; their upper edge, on which the oblong sori (spore masses) are situated, is slightly lobed, so that the continuity of the line of fructification is broken (Fig. 89).—*Hooker, Species Filicum*, i., p. 203. *Nicholson, Dictionary of Gardening*, ii., p. 280. *Beddome, Ferns of Southern India*, t. 23. *Lowe, New and Rare Ferns*, t. 16B.

Fig. 89. Fronds of Lindsaya cultrata (½ nat. size).

L. (Synaphlebium) davallioides—Syn-aph-leb′-ĭ-um ; dav-al-lĭ-ŏ-i′-dēs (Davallia-like), *Blume.*

This species, also known in gardens as *Davallia Kunzeana*, is a native of the Malayan Peninsula and Islands. It is of robust habit, its fronds, which are formed of a long central point and two or three pairs of curved branches 4in. to 8in. long, are produced from a short-creeping rhizome (prostrate stem) and borne on firm, erect stalks 6in. to 12in. long. The pinnæ (leaflets) have their lower margin straight or slightly curved, while the upper one shows four to six regular, rounded but not deep lobes, placed close together but not overlapping, on the margin of which the sori (spore masses) are uniformly disposed. The whole plant is of a very pleasing, lively, tender green colour.—*Hooker*, *Species Filicum*, i., p. 224, t. 68A. *Beddome*, *Ferns of British India*, t. 141.

L. (Isoloma) divergens — Is-ol-o′-ma ; di-ver′-gens (wide-spreading), *Wallich.*

A curious species, native of the Malayan Peninsula and Borneo, with a creeping rhizome (prostrate stem) of a wiry nature, producing somewhat sparingly fronds 6in. to 12in. long, 1½in. to 2in. broad, and simply pinnate (only once divided to the midrib), borne on stout, hard, ebony-black and very glossy stalks 4in. to 6in. long. The numerous leaflets, of a coriaceous (leathery) texture, bright green above and glaucous (bluish-green) beneath, are of a peculiar shape, being obliquely truncate at the base below and auricled (eared) at the base above, with their margin entire and bluntish at the point. The sori (spore masses) are disposed in a continuous line along both edges. Being of a pleasing colour, this species is very attractive.—*Hooker*, *Species Filicum*, i., p. 210. *Nicholson*, *Dictionary of Gardening*, ii., p. 280. *Beddome*, *Ferns of British India*, t. 250.

L. dubia—dub′-ĭ-a (doubtful), *Sprengel.*

A native of Venezuela, Guiana, and the Valley of the Amazon, producing from a short-creeping rhizome (prostrate stem) fronds 4in. to 8in. long, 1½in. to 2in. broad, simply pinnate (only once divided to the midrib), and borne on stalks closely set together, 3in. to 6in. long, and of a wiry nature. The pinnæ (leaflets), 1in. long and not more than ⅛in. broad, have their upper

edge notched towards their gradually-narrowing point; they are of a soft, papery texture, and the line of sori (spore masses) is not interrupted till it reaches the crenations (notches) of the outer third of the upper margin.—*Hooker*, *Species Filicum*, i., p. 209, t. 64c. *Nicholson*, *Dictionary of Gardening*, ii., p. 280.

L. elegans—e′-leg-ans (elegant). Synonymous with *L. stricta.*

L. (Isoloma) elongata—Is-ol-o′-ma; e-lon-ga′-ta (lengthened), *Labillardière.*

A greenhouse species, of somewhat large dimensions, native of New Caledonia and the Isle of Pines. Its ample fronds, 1ft. to 1½ft. long, 6in. to 9in. broad, broadly triangular, and tripinnatifid (three times divided nearly to the midrib), are produced from a stout, creeping rhizome (prostrate stem) densely covered with narrow filaments; they are borne on stout, erect, chestnut-brown, polished stalks 6in. to 9in. long, and are of a leathery texture. The sori (spore masses) occupy nearly or quite the whole margin of the lobes, which are of a peculiar shape, being broader at their summit than at the base.—*Hooker*, *Species Filicum*, i., p. 213.

L. (Schizoloma) ensifolia—Schiz-ol-o′-ma; en-sif-ol′-ĭ-a (sword-fronded), *Swartz.*

This greenhouse species has a very wide range of habitat, being a native of Hong-Kong, and, according to Beddome, found at the foot of the Sisparah and Carcoor Ghats, in Malabar; it also occurs at an elevation of 4000ft. in the Himalayas, whence it extends to Queensland, the Polynesian Islands, Mauritius, Madagascar, Natal, Cape Colony, and the Guinea Coast. In general habit it is much like the popular *Pteris cretica*, and it is very variable in size and in the number of the leaflets. Its narrow-spear-shaped fronds, 6in. to 12in. long, 3in. to 4in. broad, simple (undivided) at their summit and simply pinnate (only once divided to the midrib) below, are produced from a stout, creeping rhizome (prostrate stem) of a scaly nature, and borne on wiry stalks 6in. to 9in. long. The leaflets, all distinctly stalked, are usually disposed in pairs and of various shapes, only the barren ones, which are broader than the others, being toothed. The sori (spore masses) are disposed in a continuous line on the margin of the fertile leaflets, which are abundantly produced. *L. Griffithiana* is a simple-fronded form of

this species.—*Hooker*, *Species Filicum*, i., p. 220. *Nicholson*, *Dictionary of Gardening*, ii., p. 280. *Beddome*, *Ferns of Southern India*, t. 25.

L. (Diellia) erecta—Dĭ-el′-lĭ-a ; e-rec′-ta (upright), *Hooker*.

A stove species, of little decorative value, native of the Sandwich Islands. —*Hooker*, *Synopsis Filicum*, p. 113.

L. (Diellia) falcata—Dĭ-el′-lĭ-a ; fal-ca′-ta (sickle-shaped), *Hooker*.

This handsome species, native of the Sandwich Islands, is distinguishable at first sight by the brilliant green tint peculiar to its elegant fronds. These are 1ft. to 1½ft. long, 2in. to 4in. broad, spear-shaped, and simply pinnate (only once divided to the midrib) ; they are borne on strong, erect stalks 3in. to 4in. long and of a densely scaly nature. The pinnæ (leaflets), 1in. to 2in. long and ½in. broad, are sickle-shaped and slightly undulated at the margin, the upper half being rather broadest and auricled at the base ; the lower ones are very short and blunt, and all are of a soft, papery texture. The sori (spore masses) are marginal.—*Hooker*, *Synopsis Filicum*, p. 113. *Nicholson*, *Dictionary of Gardening*, ii., p. 280.

L. falciformis—fal-cif-or′-mis (scythe-shaped), *Hooker*.

A plant from British Guiana, and one which is probably but a young, unbranched form of *L. trapeziformis*.—*Hooker*, *Synopsis Filicum*, p. 104.

L. filiformis—fi-lif-or′-mis (thread-like), *Hooker*.

This species, native of British Guiana and probably the smallest and slenderest of the branched species, has fronds 4in. to 6in. long, formed of a long, simple terminal leaflet and several pairs of short, spreading branches below ; they are borne on slender, very flexuose (zigzag-bending), brownish-black stalks 2in. to 4in. long, of a wiry nature. The texture is of a soft, papery, and transparent nature, and the sori (spore masses) are disposed in a continuous line along the upper edge of the pinnules (leafits).—*Hooker*, *Species Filicum*, i., p. 212, t. 63D.

L. flabellulata—fla-bel-lul-a′-ta (fan-shaped), *Dryander*.

A native of South-East China, the Malayan Peninsula and Islands, Ceylon, North Australia, &c., with fronds produced from a short-creeping

rhizome (prostrate stem) and borne on erect, wiry, brownish-black, polished stalks 4in. to 12in. long. It is very variable in character, also in the size of its leaflets and in its ramification, as its elegant, narrow-spear-shaped fronds, 6in. to 12in. long, are sometimes simply pinnate (only once divided to the midrib), whereas in other cases they are furnished with several pairs of lateral branches and shortly-stalked and somewhat fan-shaped leaflets, their lower line being straight or decurved and the upper one rounded, entire or lobed, with the point broadly rounded. The sori (spore masses) are disposed in a continuous line, except when interrupted by the lobes. *L. tenera* is a form of this species.—*Hooker*, *Species Filicum*, i., p. 211, t. 63c. *Nicholson*, *Dictionary of Gardening*, ii., p. 280. *Beddome*, *Ferns of British India*, t. 216.

L. (Schizoloma) Fraseri—Schiz-ol-o′-ma ; Fra′-ser-i (Fraser's), *Hooker.*

Though described as a species and illustrated in Hooker's "Species Filicum" (vol. i., p. 221, t. 70B), it is not at all unlikely that this plant with simply-pinnate fronds, native of Queensland, is only a small, delicate form of *L. heterophylla.*—*Hooker*, *Synopsis Filicum*, p. 112.

L. (Schizoloma) Griffithiana—Schiz-ol-o′-ma ; Grif-fith-ĭ-a′-na (Griffith's), *Hooker.*

A simple-fronded form of *L. ensifolia*, native of Mergui, Burmah.—*Hooker*, *Species Filicum*, i., p. 219, t. 68B. *Beddome*, *Ferns of British India*, t. 29.

L. (Schizoloma) Gueriniana—Schiz-ol-o′-ma ; Guer-in-ĭ-a′-na (Guérin's), *Gaudichaud.*

This species, native of the Malayan Peninsula and Islands, is distinct in general appearance from any other known Lindsaya. Its long and very narrow fronds, produced from a short-creeping, scaly rhizome (prostrate stem), and borne on flexible stalks 4in. to 6in. long, are of a coriaceous (leathery) texture and measure from 6in. to 9in. in length. They are oblong-spear-shaped and simply pinnate (only once divided to the midrib), with leaflets about ½in. long, egg-shaped or oblong, nearly entire, horizontal, and slightly auricled (eared) at the base on the upper edge. The sori (spore masses) are

disposed in a continuous line along both margins.—*Hooker*, *Species Filicum*, i., p. 221. *Beddome*, *Ferns of British India*, t. 340.

L. guianensis—gui-a-nen′-sis (native of Guiana), *Dryander*.

A beautiful species, closely allied to *L. trapeziformis;* it is a native of Tropical America, from Jamaica southward to Rio Janeiro. The ample fronds, produced from a short-creeping rhizome (prostrate stem), and borne on rigid, erect stalks 6in. to 12in. long and of a polished nature, are composed of a terminal, simply-pinnate point and from one to six pairs of lateral branches, 6in. to 9in. long, which sometimes are again branched. The pinnules (leafits), ½in. long and ¼in. broad, are not lobed, and their outer edge is bluntly rounded; they are so closely placed as to be sometimes imbricated (overlapping). The spore masses are disposed in a continuous line, with the outer valve produced, but altered in texture. The general appearance of the whole plant partakes very much of the habit of a good-growing Davallia; it is also very attractive on account of the lively bright green colour of its foliage.—*Hooker*, *Species Filicum*, i., p. 216, t. 62A. *Nicholson*, *Dictionary of Gardening*, ii., p. 280.

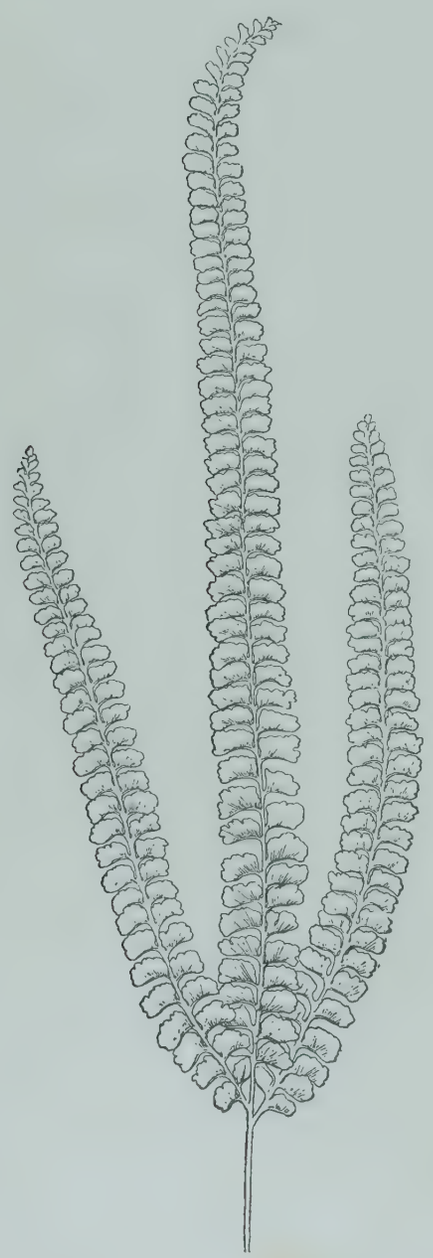


Fig. 90. Upper Portion of Frond of Lindsaya guianensis
(½ nat. size).

L. (Schizoloma) heterophylla—Schiz-ol-o′-ma; het-er-oph-yl′-la (variable-leaved), *Dryander*.

A native of the Neilgherries, Ceylon, Hong-Kong, and the Malayan Peninsula and Islands, with spear-shaped or triangular-oblong fronds, 6in. to 12in. long, 3in. to 6in. broad, produced from a short-creeping rhizome (prostrate stem) and borne on firm, naked, erect stalks 4in. to 8in. long. Its fronds vary from simply pinnate (only once divided to the midrib), with large, spear-shaped,

entire leaflets, to bipinnate (twice divided to the midrib), with branches spreading upwards, 3in. to 4in. long, and furnished with oblong-spear-shaped, blunt pinnules (leafits) of a soft, papery texture, and along the margin of which the sori (spore masses) are disposed in continuous lines. *L. Fraseri* is probably only a form of this species.—*Hooker*, *Species Filicum*, i., p. 223. *Nicholson*, *Dictionary of Gardening*, ii., p. 281. *Beddome*, *Ferns of Southern India*, t. 206.

L. horizontalis — hor-i′-zon-ta′-lis (horizontal). This is synonymous with *L. trapeziformis.*

L. humilis—hum′-il-is (humble). A synonym of *L. adiantoides.*

L. Kirkii—Kirk′-ĭ-i (Dr. Kirk's), *Hooker.*

This distinct and handsome species, of robust habit and somewhat large dimensions, is a native of the Seychelles. Its ample fronds, 1ft. to 2ft. long, 6in. to 9in. broad, and of a thin, papery texture, are borne on stout, nearly upright stalks 1ft. to 2ft. long ; they are formed of a long, unbranched point and from six to nine branches on each side, 6in. to 9in. long. The pinnules (leafits) are so closely placed that each overlaps the base of the next above it ; they are much decurved at the base, their outer edge being rounded ; the upper ones are notched and those nearest to the rachis (stalk of the leafy portion) frequently overlap it. The abundant sori (spore masses) are disposed round the upper edge ; they are not more than twice as broad as deep, protruded from the margin, terminating only one or two of the veins. —*Hooker*, *Synopsis Filicum*, p. 108.

L. (Isoloma) lanuginosa—Is-ol-o′-ma ; la-nu-gin-o′-sa (woolly), *Wallich.*

This species, native of the Malayan Peninsula, Tropical Australia, and the Mauritius, is of robust growth, and in habit is as little like other Lindsayas as possible, for its oblong-spear-shaped fronds, 1ft. to 2ft. long, 3in. to 4in. broad, simply pinnate (once divided to the midrib), and produced from a stout, creeping rhizome (prostrate stem) clothed with scales of a filamentous nature, greatly resemble those of *Nephrolepis acuta*, and show similar white dots on the upper side of their deciduous leaflets. These leaflets are of a leathery texture, long and narrow, entire (undivided) or very slightly

toothed towards the apex, which is sharp-pointed in the fertile and obtuse or bluntly-rounded in the barren fronds. The rachis (stalk of the leafy portion) and the short stalks on which the fronds are borne are all more or less covered with a short, woolly substance of a light brown colour. The sori (spore masses) are disposed in a continuous line along both edges.—*Hooker*, *Species Filicum*, i., p. 210, t. 69B. *Nicholson*, *Dictionary of Gardening*, ii., p. 281. *Beddome*, *Ferns of British India*, t. 140.

L. laxa—lax′-a (loose). A variety of *L. trapeziformis.*

L. L'Herminieri — L'Her-min-ĭ-e′-ri (L'Herminier's). A variety of *L. trapeziformis.*

L. linearis—li-nĕ-a′-ris (linear, long and narrow), *Swartz.*

This pretty, distinct, small, and rare greenhouse species, native of Tasmania, New Zealand, and West Australia, has much the smallest pinnæ (leaflets) of the unbranched group. Its fronds, which are produced from a creeping rhizome (prostrate stem) of a wiry nature, are simply pinnate (only once divided to the midrib), 6in. to 12in. long, with small, rigid, stalkless leaflets, often distinctly fan-shaped, the upper edge of which is very slightly toothed ; the lower ones are arranged with a considerable space between them. The sori (spore masses) are disposed in a continuous line along the upper edge of the leaflets. — *Hooker*, *Species Filicum*, i., p. 206. *Nicholson*, *Dictionary of Gardening*, ii., p. 281. *Lowe*, *New and Rare Ferns*, t. 16C.

L. (Synaphlebium) lobata—Syn-aph-leb′-ĭ-um ; lob-a′-ta (lobed), *Poiret.*

A greenhouse species, also known as *L. obtusa* and *L. recurvata*, native of the Neilgherries and Ceylon, where it occurs at 5000ft. elevation, also of Queensland and the Polynesian Islands. In size and general appearance it much resembles *L. davallioides*, but the pinnules (leafits) are deeper and not so much lobed ; it also differs from that species in its fructification, the sori (spore masses), situated on the margin of the lobes, having the inner valve of their involucre (covering) narrow and parchment-like, the edge of the frond being produced beyond it and scarcely altered.—*Hooker*, *Synopsis Filicum*, p. 111. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

L. Lobbiana—Lob-bĭ-a′-na (Lobb's). Synonymous with *L. cultrata.*

L. Macgillivrayi—Mac-gil-liv-ray′-i (Macgillivray's), *Carruthers.*

The fronds of this species, native of New Caledonia and the Isle of Pines, are 1ft. to 1½ft. long, triangular, bipinnate (twice divided to the midrib), and borne on straw-coloured, naked stalks. The leaflets, nearly 1ft. long and 1in. broad, are furnished with stalked pinnules (leafits) disposed alternately (not opposite), of a leathery texture, and with both surfaces naked and green; their upper border is straight and the lower rather ascending. The sori (spore masses) are disposed in a continuous line along the upper and outer edge. In habit this species resembles *L. Kirkii* and some large forms of *L. guianensis.*—*Hooker*, *Synopsis Filicum*, p. 109.

L. (Synaphlebium) media—Syn-aph-leb′-ĭ-um; med′-ĭ-a (intermediate), *R. Brown.*

This species, native of Tropical Australia and the adjacent islands, has the habit of *L. flabellulata;* but its triangular fronds, 6in. to 12in. long, bi- or tripinnate (twice or three times divided to the midrib), and borne on flexuose (zigzag-bending), shining, pale stalks 6in. to 12in. long, are of thicker texture. The pinnæ (leaflets), ¼in. long and ⅛in. broad, have their lower line nearly straight and the upper one rounded. The sori (spore masses) are disposed in a continuous, marginal line.—*Hooker*, *Species Filicum*, i., p. 112. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

L. (Diellia) Michleriana—Dī-el′-lĭ-a; Mich′-ler-ĭ-a′-na (Michler's), *Eaton.*

A very curious species, native of the Cataract of Truando, New Granada, with fronds 1ft. to 1¼ft. long, broadly spear-shaped in general outline, and borne on slender, elongated stalks of a slightly scaly nature; they are pinnate (once divided to the midrib) below, with leaflets 3in. to 5in. long and 1in. broad, the upper half linear, undulated at the margin. The sori (spore masses) are nearly marginal, and have the outer valve of their involucre (covering) of the same shape, but the margin of the frond is produced beyond it and unaltered.—*Hooker*, *Synopsis Filicum*, p. 113.

L. (Isoloma) microphylla—Is-ol-o′-ma; mi-croph-yl′-la (small-fronded), *Swartz.*

This greenhouse species, of medium dimensions, is a native of New Zealand and Temperate Australia. Its fronds (Fig. 91), 6in. to 18in. long,

2in. to 4in. broad, and bi- or tripinnatifid (twice or three times divided nearly to the midrib), are produced from a creeping rhizome (prostrate stem) densely covered with very narrow scales, and borne on slender, wiry, chestnut-brown, polished stalks 4in. to 6in. long. The pinnules (leafits), of a soft, papery texture, are either entire or cut down to the midrib into several obversely-triangular lobes, which, when fertile, are often not more than one line broad. The sori (spore masses) are disposed in a continuous marginal line.—*Hooker*, *Species Filicum*, i., p. 218. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

Fig. 91. Frond of Lindsaya microphylla (⅛ nat. size).

L. oblongifolia — ob-lon-gif-ol′-ĭ-a (oblong-fronded). A synonym of *L. pectinata*.

L. obtusa—ob-tu′-sa (obtuse, blunt). This is synonymous with *L. lobata*.

L. ovata—o-va′-ta (egg-shaped), *J. Smith*.

A species of small dimensions, native of the Malayan Archipelago, with fronds 4in. to 6in. long, ¾in. broad, simply pinnate (only once divided to the midrib), produced from a short-creeping rhizome (prostrate stem), and borne on black, flexuose (zigzag-bending) stalks 2in. to 3in. long and of a wiry nature. The leaflets are very blunt at the point; their lower side is obliquely truncate at the base, while their upper side is slightly auricled (eared). The spore masses are disposed in a continuous, marginal line.—*Hooker*, *Species Filicum*, i., p. 205, t. 61B.

L. parvula—par′-vul-a (small), *Fée*.

In this species, native of Trinidad, the fronds, 6in. to 8in. long, borne on stalks of similar dimensions, are bipinnate (twice divided to the midrib) when fully developed, with a few distinct leaflets 2in. to 3in. long and ½in. broad. The sori (spore masses) are continuous, the outer valve of their

involucre (covering) being protruded beyond the inner one.—*Hooker*, *Synopsis Filicum*, p. 471. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

L. pectinata—pec-tin-a′-ta (comb-like), *Blume.*

A species of medium dimensions, native of Assam and the Malayan Peninsula and Islands. Its fronds, 1ft. to 1½ft. long, 1in. to 2in. broad, and simply pinnate (only once divided to the midrib), are produced from a stout, wide-creeping rhizome (prostrate stem) of a scaly nature, and borne on very short, upright stalks. The leaflets, ½in. to ¾in. long and ¼in. deep, have their lower line nearly straight, the upper margin round, slightly notched, and the point not very blunt; they are set close together, but not overlapped. The sori (spore masses) are disposed in an interrupted line along the upper edge. *H. oblongifolia* is identical with this species.—*Hooker*, *Species Filicum*, i., p. 206, t. 61D. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

L. pendula—pen′-dul-a (drooping), *Klotzsch.*

This species, native of British Guiana, differs remarkably from other Lindsayas in habit and in its numerous very small, cuneate (wedge-shaped), deflexed segments. Its fronds, 9in. to 12in. long and 3in. to 4in. broad, are produced from a wide-creeping rhizome (prostrate stem) densely clothed with chestnut-brown fibres, and borne on naked, polished stalks 6in. to 9in. long; they are oblong in general outline, the main rachis (stalk of the leafy portion) being without leaflets except above the branches, which are 1½in. to 2in. long, and spread from the stem at right angles or are even slightly curved downwards. The pinnules (leafits), almost obversely triangular in shape, though placed close together, are not overlapped; those of the upper side of the branches are often deflexed and pendulous. The sori (spore masses) are disposed in a continuous line along the upper edge of the leaflets.—*Hooker*, *Species Filicum*, p. 213.

L. (Diellia) pumila—Dĭ-el′-lĭ-a; pu′-mil-a (dwarf), *Hooker.*

A very distinct species, native of the Sandwich Islands, with the habit of a large form of *Asplenium Trichomanes.* Its fronds, 4in. to 9in. long and simply pinnate (only once divided to the midrib), are borne on tufted, blackish, polished stalks 1in. to 2in. long, of a wiry nature. Their leaflets, of a some-

what leathery texture, are rounded at the point, slightly undulated, and auricled (eared) at the base on the upper side. The transversely-oblong sori (spore masses) are not quite marginal.—*Hooker*, *Synopsis Filicum*, p. 112.

L. quadrangularis—quad-ran-gul-a′-ris (four-angled). This is identical with *L. trapeziformis*.

L. recurvata—rec-ur-va′-ta (recurved). Synonymous with *L. lobata*.

L. (Isoloma) reniformis — Is-ol-o′-ma ; re-nif-or′-mis (kidney-shaped), *Dryander*.

Although extremely rare in cultivation, this species, native of Guiana and the Amazon Valley, is so thoroughly distinct that, provided a sufficient supply could be secured to satisfy all demands, it would no doubt soon be found in all good collections. Unfortunately, it is one of the most delicate species in travelling, and only after many fruitless attempts has it been imported alive at Kew Gardens, where it is growing luxuriantly. In general appearance it is very near *Adiantum reniforme ;* its fronds, however, do not rise from a compact, tufted crown, but from an underground rhizome (prostrate stem), and in that respect they resemble those of the New Zealand *Trichomanes reniforme*, less the transparent character peculiar to that species. The fronds of *L. reniformis*, borne on slender, black, polished stalks 4in. to 6in. long and of a wiry nature, are 2in. to 2½in. across, varying in form from roundish to kidney-shape, with a deep depression (sinus) at their base (Fig. 92) ; they are of a somewhat leathery texture and not pellucid. The sori (spore masses) are disposed in a continuous line all round the edge except in the sinus.—*Hooker*, *Species Filicum*, i., p. 203. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

Fig. 92. Lindsaya reniformis (⅓ nat. size).

L. (Isoloma) retusa—Is-ol-o′-ma ; ret-u′-sa (blunted). Synonymous with *Davallia retusa*.

L. rigida—rig′-id-a (rigid), *J. Smith.*

This is a thoroughly distinct species, native of the Malayan Peninsula, and at present seldom found in collections. It has a very peculiar appearance, owing to the formation of its fronds and the nature of their rigid, erect stalks, 4in. to 6in. long, furnished with short, distant prickles at the base. The fronds are produced from a wide-creeping rhizome (stem) of a densely-scaly nature, and are composed of a long, unbranched central point and one to four pairs of flexuose (zigzag-bending) lateral branches 4in. to 8in. long. The pinnules (leafits) into which these are again subdivided are of a very thick and leathery texture, with prominent veins ; they have their lower edge often falcate (sickle-shaped), the upper ones three or four times bluntly, not deeply, lobed, placed close together, but not overlapping ; those of the upper side of the branches are often deflexed and pendulous. The sori (spore masses) are disposed in a continuous line along the upper edge of the leaflets. —*Hooker*, *Species Filicum*, i., p. 213. *Nicholson*, *Dictionary of Gardening*, ii., p. 281. *Beddome*, *Ferns of British India*, t. 166.

L. (Isoloma) sagittata—Is-ol-o′-ma ; sag-it-ta′-ta (arrow-pointed), *Dryander.*

A singular-looking species, and as interesting as it is thoroughly distinct, native of Guadeloupe and French Guiana. Its simple (undivided) fronds, of a unique shape in the genus, are borne on black, polished stalks 4in. to 6in. long and of a wiry nature ; when only partly developed they are very pellucid, especially at the edges, but when mature are of a pale green colour, with numerous dark green veins radiating from the centre and extending to the very point. The leafy portion is arrow-shaped and pointed, with a deep sinus (depression) at the base, 2in. to 4in. across, and sometimes lobed. The sori (spore masses) are continuous all round the edge except in the sinus.—*Hooker*, *Species Filicum*, i., p. 203. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

L. scandens—scan′-dens (climbing), *Hooker.*

A native of the Malayan Peninsula and the Philippine Islands, and readily distinguished from other species by the wide-creeping, stout, scaly, scandent rhizome (climbing stem) from which its simply-pinnate (only once-divided) fronds, 9in. to 12in. long and 1½in. to 1¾in. broad, are produced. The leaflets, ¾in. long and ½in. broad, have their lower line slightly decurved,

the upper one rounded and entire (undivided), and the point broadly rounded; they are placed in a long row close together but not overlapping, and are of a soft, papery, and somewhat transparent nature. The sori (spore masses) are disposed in a continuous marginal line.—*Hooker*, *Species Filicum*, i., p. 205, t. 63B. *Beddome*, *Ferns of British India*, t. 298.

L. Seemanni—See-man′-ni (Seemann's), *J. Smith.*

This plant, native of the Bay of Choco, Panama, where it was discovered by Dr. Seemann, is perhaps only an American form of *L. cultrata.* Its simply-pinnate (once-divided) fronds, 6in. to 12in. long and about 1in. broad, are produced from a short-creeping rhizome (stem) and borne on stalks 3in. to 6in. long, of a wiry nature. The leaflets are of the same shape as those of *L. cultrata*, but the teeth, especially the lower ones, are deeper and the texture is thinner. The sori (spore masses) form an interrupted line along the upper margin of the leaflets.—*Hooker*, *Synopsis Filicum*, p. 105.

L. stricta—stric′-ta (upright), *Dryander.*

An exceedingly pretty, erect-growing species, also known as *L. elegans;* its habitat extends from Mexico and the West Indies southward to Rio Janeiro. The leaflets and stalks are of such a rigid nature that in drying them they can only be made to adhere to the paper with the greatest difficulty. Under cultivation it assumes many forms, all of which are very handsome. It is mostly seen with bipinnatifid fronds (twice divided nearly to the midrib), and is occasionally found with tripinnatifid fronds, but sometimes they remain simply pinnate (only once divided to the midrib); they are from 1ft. to 2ft. long, and borne on rigid, upright, polished stalks of similar length and of a chestnut-brown colour. There is a peculiar and pleasing appearance about this plant on account of the leaflets, which are recurved, of a bright, shining green colour and leathery texture, being developed on one side of the midrib only. The sori (spore masses) are disposed in a continuous line round the upper edge.—*Hooker*, *Species Filicum*, i., p. 216. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

L. tenera—ten′-er-a (slender), *Dryander.*

This is a form of *L. flabellulata*, from which it differs by its thinner texture only.—*Hooker*, *Synopsis Filicum*, p. 107.

L. trapeziformis—trap-e-zif-or′-mis (diamond-shaped), *Dryander.*

A robust species, also known as *L. horizontalis* and *L. quadrangularis*, native of Tropical America, from Cuba and Guatemala to Rio Janeiro, also of Ceylon and the Malayan Peninsula and Islands. Its elegant fronds, 6in. to 15in. long, produced from a short-creeping rhizome (stem), and borne on strong, erect stalks 6in. to 12in. long, are composed of a long, entire point and from one to four pairs of rigidly-spreading branches, which are often 6in. to 12in. long. The leaflets have their lower line nearly straight or curled upwards or downwards, and the upper ones are closely placed but scarcely overlap; all are of a soft, papery texture and somewhat transparent. The sori (spore masses) are disposed in a continuous line round the upper margin. The whole plant is of a brilliant green colour, which renders it highly attractive.—*Hooker*, *Species Filicum*, i., p. 214. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

This species is very variable, and some of its forms are very handsome; those best known are here described:

L. t. caudata—cau-da′-ta (tailed), *Hooker.*

A large, handsome, Cingalese form, with more branches than are usually found on the typical form.

L. t. laxa—lax′-a (loose), *Kunze.*

A form with the upper margin of the leaflets broadly lobed, so that the line of fructification is more or less interrupted throughout.

L. t. L'Herminieri—L'Her-min-ĭ-e′-ri (L'Herminier's), *Fée.*

A plant from Guadeloupe, with the pinnules (leafits) broadest at the outer edge and the upper margin concave.

L. (Isoloma) trichomanoides—Is-ol-o′-ma; trich-om-an-ŏ-i′-dēs (Trichomanes-like), *Dryander.*

A distinct and pretty, dwarf-growing, greenhouse species, native of New Zealand, Tasmania, and New South Wales, with oblong fronds 4in. to 9in. long and 2in. to 3in. broad, produced from a creeping rhizome (stem) of a scaly nature, and borne on slender, wiry stalks 4in. to 6in. long, of a chestnut-

brown colour. The spear-shaped leaflets, 2in. to 3in. long, are cut down quite to the midrib into cuneate pinnules (wedge-shaped leafits), which are again broadly lobed on the upper edge; they are of a thin, papery texture and of a very pleasing bright green colour. The sori (spore masses) are disposed in a continuous, marginal line.—*Hooker*, *Species Filicum*, i., p. 218. *Nicholson*, *Dictionary of Gardening*, ii., p. 281.

L. (Schizoloma) Vieillardii—Schiz-ol-o′-ma; Vieil-lard′-ĭ-i (Vieillard's), *Mettenius.*

A native of New Caledonia, with triangular fronds 3in. to 6in. long and distinctly stalked. The leaflets are narrow-strap-shaped, ascending, 1in. to 3in. long and ½in. to ¾in. broad; the barren ones are sharply cleft partly to the midrib, while the fertile ones are entire (undivided); all are of a rigid, leathery texture and of a dark green colour. The sori (spore masses) are continuous.—*Hooker*, *Synopsis Filicum*, p. 471.

L. virescens—vir-es′-cens (greenish), *Swartz.*

A greenhouse species, native of the Organ Mountains, Brazil. It has somewhat triangular fronds, 6in. to 9in. long and 4in. to 6in. broad, produced from a short-creeping rhizome, and borne on slender, dark, polished, flexuose (zigzag-bending) stalks 6in. to 9in. long. These fronds are composed of a simply-pinnate (once-divided) point and several pairs of spreading branches, some of which are again a little branched below; their pinnules (leafits), of a papery texture, are nearly entire, or once or twice cleft from the upper margin, placed close together, but not overlapping. The sori (spore masses) are disposed in a continuous line, except when interrupted by the lobes. *L. Catherinæ* is merely a variety of this species.—*Hooker*, *Species Filicum*, i., p. 213, t. 65B.

L. (Isoloma) Walkeræ—Is-ol-o′-ma; Walk′-er-æ (Mrs. Walker's), *Hooker.*

A most curious species, native of Ceylon and the Island of Banca, east of Sumatra. Its simply-pinnate (once-divided) fronds, 6in. to 12in. long and 2in. to 4in. broad, are borne on erect, polished, wiry stalks 6in. to 12in. long, of a glossy black or rather dark purple hue, and produced from a thick, creeping rhizome (stem) covered with rusty-brown, hair-like scales. The

leaflets, 1½in. to 2in. long and ¼in. broad, are entire (undivided) and disposed in pairs, with several times their breadth between them. In general appearance this plant somewhat resembles a miniature form of the well-known *Gymnogramme javanica*. The sori (spore masses) are disposed in a continuous line along both edges.—*Hooker*, *Species Filicum*, p. 209, t. 69A. *Beddome*, *Ferns of Southern India*, t. 215.

LITOBROCHIA—Li-tob-roch′-ĭ-a. *See* **Pteris.**

CHAPTER XXXII.

LLAVEA, *Lagasca.*

(Lla′-ve-a.)

Mexican Flowering Fern.

THE memory of M. la Llave, the discoverer of the species, is perpetuated in this genus, which in Hooker and Baker's "Synopsis Filicum" forms Genus 28, immediately following *Onychium*. It somewhat resembles that genus so far as the fructification is concerned, but there ends the comparison. It is composed of a solitary species, also known in gardens as *Ceratodactylis osmundioides:* this latter name, for which we are indebted to J. Smith, is derived from *keras*, a horn, and *dactylos*, a finger, in allusion to the fertile divisions of the frond, which are only the terminal part of the barren ones. The specific name *osmundioides* is indicative of the similarity in appearance between this species and *Osmunda*. The distinctive characters of *Llavea* reside in the peculiar division of the barren and fertile portions of the same frond, as above stated, and also in the nature of the sori (spore masses), which are linear (long and very narrow), occupying the whole length of the pod-like segments of the changed upper portion of the frond; their involucre (covering) is of the same shape, rolled over and completely covering them.

Culture.

Although an old inhabitant of our gardens, *L. cordifolia* is unfortunately seldom found in collections. The fact of its being generally grown in too warm a place, explains the speedy death of specimens which, under cooler

treatment, would have lasted for years and increased in size and strength. The plant is of a thoroughly evergreen habit, and in an intermediate or temperate house forms a splendid subject, either grown as a pot plant or, better still, planted on rockwork or in any place where drainage is perfect, on the summit of a projecting "rock" for instance, in a mixture of peat and sand in about equal parts; a little crock-dust may with advantage be added to the compost, as this helps to keep the soil open, which seems the condition most essential to the welfare of the plant. It should be placed in a well-ventilated position, and syringing overhead should be carefully avoided. It is usually propagated by the division of the crowns.

L. cordifolia—cor-dif-ol-ĭ-a (having cordate or heart-shaped fronds), *Lagasca.*

A very interesting, handsome, and delicate-fronded Fern, native of Mexico, where it is found ascending to 7500ft. elevation. When grown under suitable conditions, it is greatly admired on account of the glaucous (pale bluish-green) tint of its fronds, which are singular in appearance as well as elegant. These fronds are produced from a close, scaly crown, and borne on erect, smooth, slender stalks of a pale straw-colour, 1ft. long, and clothed at their base with broad, spear-shaped scales of a chaffy nature and silver colour. They are from 1ft. to 2ft. long, 6in. to 12in. broad, and tripinnate (three times divided to the midrib); their lower half is formed of numerous egg-shaped pinnules (leafits), 1½in. to 2in. long, ½in. to ¾in. broad, and distinctly stalked, the whole of a very pleasing light green or glaucous colour. The interest of the plant undoubtedly resides in the fertile portion of the fronds: these pod-like segments, 1½in. to 3in. long and narrow, have the appearance of a mass of pale pea-green catkins disposed in an elegantly pendulous panicle; their margins are of a parchment-like texture, curved in, and forming the involucre. On this account alone the plant well deserves a prominent place among the so-called "Flowering Ferns," of which group it is one of the most distinct members.—*Hooker*, *Species Filicum*, ii., p. 125. *Nicholson*, *Dictionary of Gardening*, ii., p. 288. *Lowe*, *New and Rare Ferns*, t. 30.

CHAPTER XXXIII.

LOMARIA, *Willdenow.*

(Lo-ma′-rĭ-a.)

THIS genus, which derives its name from *loma*, an edge, in reference to the position of the spore masses on the fronds, is an important group of stove, greenhouse, and hardy Ferns of world-wide distribution, though its headquarters are situated in the South Temperate zone. There is but one British example, *L. Spicant* of Desvaux (or, as it is most commonly called, *Blechnum Spicant*), but this has produced many variations, some of which are quite distinct from the typical plant. An idea of the extension of the area in which certain species are found in their wild habitats may be formed from the geographical distribution of *L. Spicant*, which, besides being found in Europe from the extreme North to the islands of the Mediterranean and Madeira, and in America from California to Oregon and British Columbia, is also abundant in the Caucasus, Kamtschatka, and Japan. In Hooker and Baker's "Synopsis Filicum" *Lomaria* forms Genus 33, immediately preceding the genus *Blechnum*, with which it is closely related.

Some of the Lomarias are widely distinct from one another in habit and general appearance, for, while a few have simple (undivided) fronds, these organs in others are pinnatifid (divided nearly to the midrib), pinnate (once divided to the midrib), or even bipinnatifid (twice divided nearly to the midrib). The distinctive characters of the genus reside in the dimorphous (two-formed) character of the fronds, as the barren and the fertile ones are

totally distinct, the latter being always entirely contracted; also in the disposition of the sori (spore masses), which are linear (long and narrow), continuous (uninterrupted), parallel with the midrib, occupying the whole or nearly the whole of the space between it and the edge, and covered by an involucre of a parchment-like texture, formed of the revolute (curled-up) edge of the frond.

The only accepted sub-division of the genus is:

Plagiogyria (Plag-ĭ-og-y′-rĭ-a), *Kunze*, which differs from *Lomaria* proper in having the base of the stalk suddenly dilated, fleshy, triquetrous (three-cornered), and furnished with large, spongy glands. Their capsules are also furnished with an oblique ring.

According to their habit and mode of growth, Lomarias are divided into three sections as follows:

Section I. Plants with fronds either simple or pinnate, and lower leaflets of the barren fronds more or less distinctly dilated and connected at the base. The best-known representative is *L. gibba.*

Section II. Plants with fronds distinctly pinnate, the central and lower leaflets of the barren ones being narrowed at the base and always distinctly separated from one another. This section is best represented by *L. procera.*

Section III. Plants with barren fronds either bipinnatifid or bipinnate, as illustrated by *L. Fraseri* and also by the Australian form of *L. discolor*, called *L. d. bipinnatifida.*

Culture.

The members of this extensive genus, replete with interesting species of highly decorative qualities, are, as we have said, found in nearly all parts of the globe, and, owing to that fact, their constitution is such that, while some few, such as those which come from New Caledonia, the West Indies, and Tropical America, need stove treatment, the great bulk of them are greenhouse plants. It is especially the numerous and handsome species native of Brazil, Chili, New Zealand, Australia, and Africa, which can be employed with the utmost advantage for the ornamentation of our cool-houses, as not only is this mode of treatment the most rational and the least expensive, but it is also the only one under which such species thrive well. It is an indisputable fact that, whereas fine-foliaged or flowering plants can often,

when submitted to the influences of great heat and moisture, be induced to grow more rapidly, in the case of Lomarias a temperature kept above their requirements is productive of disastrous results. This is undoubtedly owing to their natural dislike of having water over their foliage, and plants under such conditions must be copiously syringed to counterbalance the effects of the heat employed in the process of "forcing." Now, to Lomarias this mode of culture cannot possibly be applied with any chance of success. First, because, as soon as the temperature becomes too high, thrips make their appearance; and, secondly, if water overhead is used at all, the texture of the foliage of most species is such that the fronds get spotted, and the whole plants in a very short time present a wretched appearance. As these remarks are applicable to nearly all the species, large and small alike, and as they are of the utmost importance for the successful management of this particular genus, they cannot possibly be too carefully observed.

Besides some Japanese and Chilian species which are thoroughly hardy in many parts of England, there is *L. Spicant*, the only member of the genus having a claim to European origin. This is found in nearly all parts of Europe — in Denmark, Norway, Sweden, &c. In this country it is very commonly met with in Hertfordshire, Worcestershire, and many northern districts, where it grows abundantly under hedges and in lanes, as well as in Ireland, especially in the counties of Clare and Wicklow; but the coldest habitat to which it is indigenous with us is the Cairngorm Mountain, in Aberdeenshire, where it is found at an elevation of 1200ft.

But if the different species of *Lomaria* need various temperatures, one kind of soil is, with very few exceptions, suitable for all of them. It should consist of about equal parts of good fibrous loam, leaf-mould, and silver sand. Where leaf-mould is not easily procurable, an equal proportion of peat may be substituted, but leaf-mould is best. A few of the smallest-growing kinds, such as *L. alpina*, *L. Germainii*, and *L. lanceolata*, are adapted for growing in Fern-cases, where, on account of their distinctly-shaped fronds, they contrast in a pleasing manner with the more feathery as well as with the more massive kinds with which they are associated. Several species are also useful for room-decoration, the principal among them being the well-known and much-appreciated *L. gibba*, which for that purpose is very extensively raised by our wholesale growers, innumerable quantities finding

their way every year to our metropolitan markets. The slower-growing, but very compact, *L. ciliata* and *L. discolor nuda* are also highly decorative.

Although they will not bear being kept dry, Lomarias do not require so much water at the roots as do the majority of other Ferns. They should be potted somewhat loosely, for they dislike the soil being pressed hard into the pots. An excellent way of making use of them is planting them in dead Tree-Fern stems. Remove the decayed or partly-decayed matter from the centre of the stems, and scoop them out sufficiently to accommodate a solitary plant with a little mould round it, in order to give it a start; after that, keep the stem constantly moist, and the result will be that in a short time the roots of the transplanted Lomaria will have taken possession of the dead stem, in which they run apace. The plant will have the appearance of a handsome Lomaria with a stout stem of its own, and, if properly managed, will remain for years in excellent condition. A few species are naturally of arborescent habit, but this is rather the exception than the rule.

Lomarias are almost invariably increased by means of their spores, which are abundantly produced and germinate very freely.

Principal Species and Varieties.

L. acuminata—ac-u′-min-a′-ta (taper-pointed), *Baker.*

This greenhouse species, of medium dimensions, native of Norfolk Island, is intermediate between *L. attenuata* and *L. lanceolata.* Its barren fronds, borne on nearly chestnut-coloured stalks 2in. to 3in. long, are oblong-spear-shaped, being narrowed gradually from the middle to both ends, 1½ft. to 2ft. long, and 4in. to 6in. broad. They are furnished with from thirty to forty pairs of spear-shaped and taper-pointed leaflets about ½in. broad, adnate (attached to the midrib) through their whole length by their enlarged base. The texture is somewhat leathery, and both surfaces are of a dark green colour. In the fertile frond the leaflets are distant (distinctly separate), the central ones being 3in. to 4in. long.—*Hooker*, *Synopsis Filicum*, p. 481.

L. acuta—ac-u′-ta (acute, sharp), *Desvaux.*

A stove species, of large dimensions, native of Peru and New Granada. Its stout, upright fronds, 2ft. to 3ft. long, borne on strong, erect stalks 4in.

to 6in. long, of a dark colour, and scaly below, are produced from a stout stem that is densely scaly at the crown ; they are of a leathery texture, and gradually narrowed towards both ends. The barren ones are quite pinnate, the numerous leaflets with which they are furnished on each side of the midrib being quite distinct and 1in. or more distant at the base. The leaflets of the fertile fronds, very narrow and 4in. to 6in. long, are also about 1in. distant. —*Hooker*, *Species Filicum*, iii., p. 30, t. 151.

L. (Plagiogyria) adnata—Plag-ĭ-og-y′-rĭ-a ; ad-na′-ta (adnate, attached to the midrib), *Blume*.

In this stove species, of medium growth, native of Java and Khasya, the central leaflets of the barren fronds are dilated and connected at the base, while the lower ones are narrowed at the base and situated about ½in. distant ; all are of a somewhat leathery texture, have their point narrowed gradually, and are finely toothed. The whole barren fronds, produced from a stout, short stem, and borne on firm, erect, naked stalks 6in. to 18in. long and enlarged at the base, are broadly-egg-shaped, 1ft. to 1½ft. long and 4in. to 6in. broad. The fertile fronds are of similar shape, but the leaflets are distant and narrowly linear.—*Hooker*, *Synopsis Filicum*, p. 182.

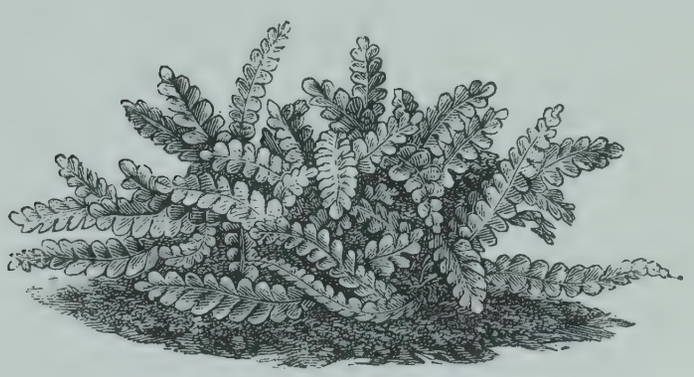


Fig. 93. Lomaria alpina (⅛ nat. size).

L. alpina — al-pi′-na (mountain-loving), *Sprengel*.

This pretty little evergreen, almost hardy Fern, of smaller dimensions than our common *L. Spicant*, is a native of Temperate South America (where it is plentiful), New Zealand, Tasmania, and South Australia. As in the case of all other Lomarias, the barren and the fertile fronds are totally distinct ; both are produced from a wide-creeping rhizome (prostrate stem) clothed at the crown with spear-shaped, rusty-brown scales. The barren ones, 4in. to 8in. long and ½in. to ¾in. broad, are narrowly spear-shaped, with closely-set, blunt leaflets (Fig. 93) ½in. long, of a somewhat leathery texture, and of a bright metallic hue when young, turning with age to a very dark

green colour. The fertile ones, borne on stalks 4in. to 8in. long, have their leaflets narrower and more distant; these do not share the changes of colour which affect the sterile ones.—*Hooker*, *Species Filicum*, iii., p. 16. *Nicholson*, *Dictionary of Gardening*, ii., p. 293. *Lowe*, *Ferns British and Exotic*, iv., t. 52A.

Although it may in many sheltered places be treated as a hardy Fern, this species succeeds best and remains evergreen in the greenhouse. It is extremely useful for edging in the rockery or for planting in groups, making patches of a metallic or dark green colour on, say, the point of a rock, as it is a plant which requires very little soil in which to grow.

L. andina—and′-in-a (from the Andes), *Baker*.

A greenhouse species, of small dimensions, native of the Andes of Peru, with barren fronds somewhat spear-shaped, seldom more than 2in. long and ¼in. broad, produced from a very slender, wide-creeping rhizome (prostrate stem), and borne on very slender stalks ½in. to 1in. long; their unequal-sided, blunt leaflets are of a firm, parchment-like texture, naked on both surfaces, and of a dark green colour. The fertile fronds are narrower and their leaflets are more distant.—*Hooker*, *Synopsis Filicum*, p. 482.

L. aspera—as′-per-a (rough), *Klotzsch*.

This greenhouse species, native of Chili and Chiloe, is one of the very few Lomarias known to be proliferous, the end of its fronds usually taking root and producing new plants. It is of dwarf habit, with barren fronds 6in. long, 2in. broad, broadly spear-shaped, and very gradually narrowed below; their leaflets, of a leathery texture, are slightly enlarged at the base, auricled (eared) on their upper side, closely set, and blunt at their extremity. The fertile fronds are much smaller, about 3in. long by ¾in. broad, and borne on a longer stem.—*Hooker*, *Species Filicum*, iii., p. 14, t. 144.

L. attenuata—at-ten-ŭ-a′-ta (attenuated), *Willdenow*.

This distinct and handsome species, of easy cultivation, has a particularly wide range of habitat, being found in America, from the West Indies and Guatemala southward to Brazil and Juan Fernandez; also in the Polynesian, Norfolk, Mauritius, and Bourbon Islands, Fernando Po, and Cape Colony.

It is usually met with growing wild, either on the sides of Tree Ferns or on partly-decayed branches of trees. The barren fronds, 1ft. to 3ft. long and very gradually narrowed downwards, are furnished with numerous leaflets connected at the base, 3in. to 4in. long, ½in. to ¾in. broad, gradually narrowing towards the point, which is sometimes bluntly toothed ; they are of a leathery texture, and when young are of a very pretty rosy tint, but later on become dark green. The fertile fronds, of similar shape, are much smaller, their numerous leaflets being very much contracted and of a uniform dark green colour at all times. Both kinds of fronds are produced from a stout, decumbent caudex (stem) densely clothed with narrow scales of a bright brown colour, with which the crown also is entirely covered ; they are borne on upright stalks 4in. to 6in. long, naked or but slightly scaly below. *L. gigantea* of Kaulfuss is identical with this species.—*Hooker*, *Species Filicum*, iii., p. 6. *Nicholson*, *Dictionary of Gardening*, ii., p. 293. *Lowe*, *Ferns British and Exotic*, iv., t. 64.

L. auriculata—aur-ic-ul-a′-ta (auricled, eared), *Baker.*

A stove species, of medium dimensions, native of Lord Howe's Island, with barren fronds oblong-spear-shaped, 1ft. long, 3in. to 3½in. broad at the middle, gradually narrowed to the base, and furnished with fifteen or sixteen pairs of leaflets. The upper and central leaflets are spear-shaped, ascending, bluntish, entire (undivided), connected at their base by a wing ⅛in. to ⅙in. broad ; the lowest ones, much reduced and ¾in. to 1in. long, are free, though auricled (eared) on both sides at the base. The texture is somewhat leathery, the colour dull dark green, and both surfaces and the rachis (stalk of the leafy portion) are densely clothed with purplish-brown hairs. Fertile fronds are unknown.—*Hooker*, *Synopsis Filicum*, p. 481.

L. australis—aus-tra′-lis (Southern), *Link.*

This greenhouse species, native of the Cape of Good Hope, is one of the most beautiful of the whole genus ; but although introduced into the Royal Gardens, Kew, as far back as 1839, it has never become plentiful in this country. Its barren fronds, 1ft. to 2ft. long, are very symmetrical in form and furnished with oblong or spear-shaped, stalkless leaflets, of a dark, rich green colour, the upper ones being even attached to the midrib. In the fertile

fronds, which are of similar oblong shape, the leaflets are longer, very narrow, and auriculate (eared) at the base.—*Lowe*, *Ferns British and Exotic*, iv., tt. 50 and 58.

L. Banksii—Bank′-sĭ-i (Banks's), *Hooker*.

A greenhouse species, of small dimensions, native of New Zealand. It is easily distinguished at first sight from all its allies by the peculiar shape of its leaflets, the upper ones being frequently more than half as broad as they are long. The barren fronds, 6in. to 9in. long and about 1in. broad, are furnished with closely-set, oblong, blunt, spreading leaflets of a leathery texture and dull green colour. The fertile fronds, smaller and slenderer, have leaflets narrower and more distant. Both kinds are produced from a short, stout, stem of a woody nature and clothed upwards with spear-shaped scales of a rusty-brown colour, and are borne on erect, dark-coloured stalks of a scaly nature at the base. —*Hooker*, *Species Filicum*, iii., p. 17. *Nicholson*, *Dictionary of Gardening*, ii., p. 293. *J. Hooker*, *Flora of New Zealand*, t. 76.

Fig. 94. Barren and Fertile Fronds of Lomaria blechnoides (½ nat. size).

L. bipinnatifida—bip-in-na-tif′-id-a (twice divided nearly to the midrib). A variety of *L. discolor*.

L. blechnoides—blēch-nŏ-i′-dēs (Blechnum-like), *Bory*.

This is a greenhouse species, of small dimensions, native of Chili, and closely related to the better-known *L. lanceolata*, from which, however, it is

readily distinguished by its larger fertile fronds, which are borne on strong, erect, dark chestnut-brown stalks 6in. long. These fertile fronds are 1ft. to 1½ft. in length and 3in. in breadth, and are furnished with contracted leaflets 1½in. to 2in. long, suddenly enlarged at the base on both sides. The barren fronds, about 6in. long, 1in. to 1½in. broad, spear-shaped, and almost stalkless, have their leaflets of a leathery texture and dark green colour, somewhat sickle-shaped, enlarged at the base, and blunt at their extremity; the lower ones are reduced to mere auricles. See Fig. 94.—*Hooker*, *Species Filicum*, iii., p. 12. *Nicholson*, *Dictionary of Gardening*, ii., p. 293.

This charming little evergreen plant is well adapted for growing in Fern-cases and in small crevices of rockwork. Although in general appearance it somewhat resembles *L. alpina*, it is quite distinct from that species, but it can be used for the same purposes. Its pretty little fronds are abundantly produced from creeping rhizomes (stems) remaining close to the ground, into which they root freely.

L. Boryana—Bo-rў-a′-na (Bory's), *Willdenow.*

Undoubtedly this is one of the most distinct species of the whole genus; it is a highly decorative, greenhouse plant, native of the West Indies to the Falkland Islands and Straits of Magellan, and in gardens is better known under the synonyms *L. magellanica* and *L. zamioides* than under its proper name. It is easily distinguished from any other Lomaria by its extremely dense habit and the succulent texture of its foliage. Although it hardly grows to sufficient height to be classed among Tree Ferns, it produces a stout, massive trunk or stem, which on the Organ Mountains of Brazil attains a height of from 3ft. to 4ft., and is densely clothed with large, deep black, chaffy scales. From the trunk rise a quantity of sturdy, egg-shaped barren fronds 1ft. to 2ft. long, 6in. to 8in. broad, and having the general appearance of Zamia-leaves. They are borne on stout, erect stalks 4in. to 6in. long, and are furnished with spear-shaped leaflets, gradually narrowed to the point, narrowed and sometimes auricled (eared) at the base, and so closely set as to be almost imbricated (overlapping), especially in young plants. The colour of the upper side is a dark, shining green, whereas the under-surface is at first of a bright tawny hue, gradually turning to a very pale green in mature fronds. The fertile fronds are of more upright habit,

though of similar shape, and are furnished with narrow leaflets which show an involucre (covering) of a parchment-like texture and sometimes fringed.—*Hooker*, *Species Filicum*, ii., p. 27 ; *Garden Ferns*, t. 52. *Nicholson*, *Dictionary of Gardening*, ii., p. 293. *Lowe*, *Ferns British and Exotic*, iv., t. 62.

There are in gardens several acknowledged varieties of *L. Boryana*, the most distinct of which are the following :

L. B. cycadoides—cyc-ad-ŏ-i′-dēs (Cycas-like), *Moore.*

A greenhouse variety, native of South-east Africa, whence it was introduced in 1875. Its barren fronds, 1ft. to 2ft. long, are produced from a stout, massive trunk, furnished about the crown and at the base of the stalks with a profusion of long, soft, black scales ; their broadly spear-shaped leaflets are blunt at the extremity, of a deep green colour and leathery texture ; the fertile ones, narrowly spear-shaped and contracted, are recurved at their extremity. The fertile fronds differ only in their leaflets being contracted, and thus appearing set farther apart. This is the same plant as *L. zamiæfolia* of gardens and *L. zamioides* of Gardner.—*Nicholson*, *Dictionary of Gardening*, ii., p. 293.

L. B. Dalgairnsiæ—Dal-gairn′-sĭ-æ (Miss Dalgairns'), *Moore.*

A variety introduced into European gardens from South Africa in 1877. Its trunk, of a blackish colour, is shaggy at the top with long, dark brown scales. The barren fronds are distinctly pinnate (once divided to the midrib), spear-shaped, and furnished with spear-shaped, sharp-pointed leaflets, dark green above and paler beneath. The fertile fronds, of similar shape, are of very upright, rigid habit, and have their leaflets conspicuously contracted. For the accompanying Plate we are indebted to Mr. William Bull.—*Nicholson*, *Dictionary of Gardening*, ii., p. 293.

L. B. robusta—ro-bus′-ta (strong), *Carmichael.*

A stout-growing form, native of the Island of Tristan d'Acunha. It is readily distinguished from the species and from the other varieties by the rachis (stalk of the leafy portion) of its fronds being densely clothed throughout with long, narrow, fibre-like scales of a dark brown colour.—*Hooker*, *Synopsis Filicum*, p. 180.

L. capensis—ca-pen′-sis (from the Cape). A variety of *L. procera*.

L. caudata—cau-da′-ta (having a tail), *Baker*.

This stove species, native of the Andes of Ecuador, has the general appearance of the better-known *L. procera*, from which, however, it is distinguished at first sight by the proliferous character of its barren fronds, which are 2ft. or more long, 4in. broad, gradually narrowed below, and elongated and rooting at their extremity. These fronds are produced from an elongated stem or trunk densely clothed at its summit with spear-shaped scales of a dark brown colour, and are borne on strong, erect stalks 2in. to 3in. long, scaly below; they are furnished with numerous leaflets of a leathery texture and bright green colour, all quite distinct, suddenly narrowed to the midrib, but not stalked at the base, where they are slightly auricled (eared) on the lower side, and suddenly narrowed at the point. The lower leaflets are blunt and gradually dwindle down to mere auricles or lobes; those above the centre of the frond gradually grow smaller and more blunt to where it takes root. The fertile fronds, of similar shape but not proliferous, are furnished with narrow, contracted leaflets 3in. to 4in. long and disposed at least ½in. apart.—*Hooker*, *Synopsis Filicum*, p. 179.

L. chilensis—chil-en′-sis (Chilian). A variety of *L. procera*.

L. ciliata—cil-ĭ-a′-ta (ciliated, fringed), *Moore*.

This very distinct, stove species, native of New Caledonia, is a general favourite on account of its rapid growth and compact, yet elegant habit. Its barren fronds, 8in. to 12in. long, broadly egg-shaped, and borne on comparatively slender stalks clothed with blackish scales, are produced from a single crown at the summit of a slender stem or trunk 6in. to 8in. high and 1½in. thick. They are simply pinnate (only once divided to the midrib) and furnished with oblong leaflets of a cheerful, light green colour, the lower ones distant and narrowed below, the upper ones more closely set and frequently with a broad, rounded auricle (ear) at the base on the lower side, bluntish, and rendered very attractive by the hair-like teeth with which they are bordered on each side. The fertile fronds, although of the same shape and drooping habit as the barren

ones, are much contracted, being furnished only with very narrow leaflets, set far apart and sometimes pinnatifid (divided again nearly to the midrib). See Coloured Plate.—*Hooker*, *Synopsis Filicum*, p. 175. *Nicholson*, *Dictionary of Gardening*, ii., p. 293.

L. ciliata is closely allied to the more popular *L. gibba*, also from New Caledonia, but it is easily distinguished from the latter species, not only through the fringe of its leaflets, but also, and principally, through their characteristic termination, which is always emarginate (slightly notched, as if a piece had been cut out) and frequently bifid (divided into two) at their extremity. Under cultivation this useful species has produced the following strong-growing variety :

L. c. gigantea—gig-ant-e′-a (gigantic).

This variety, for the name of which we can find no authority, besides partaking of all the attractive and distinctive characters of the species, is still more ornamental and of more robust growth ; and its handsome fronds attain much larger dimensions, frequently measuring 1¼ft. and even 1½ft. in length. The stalks of the fronds are densely clothed with long, narrow scales of a very dark colour, which greatly add to its beauty, as they form a pleasing contrast with the pale green colour peculiar to the leafy portions of the plant. Unfortunately, this variety has never been known to reproduce itself from spores.

Both *L. ciliata* and its variety *gigantea* should be kept in the drier part of the house, as any little moisture allowed to settle on their foliage causes the appearance of numerous black streaks, precursors of decay.

L. Colensoi—Col-en′-sŏ-i (Bishop Colenso's). Synonymous with *L. Patersoni elongata*.

L. (Plagiogyria) costaricensis — Plag-ĭ-og-y′-rĭ-a ; cos-ta-ri-cen′-sis (from Costa Rica), *Baker*.

A stove species, with barren fronds above 1ft. long, 6in. to 7in. broad, abruptly narrowed at the base, and furnished with entire (undivided), somewhat sickle-shaped leaflets less than ½in. broad, bluntish, and connected at their base with the stalks, thus forming a narrow wing all along the midrib of the leafy portion of the frond. The fertile fronds are 1½ft. long,

6in. broad, and furnished with loosely-set, contracted leaflets.—*Hooker*, *Synopsis Filicum*, p. 482.

L. crenulata—cre-nul-a′-ta (scalloped). A synonym of *L. Germainii.*

L. Cumingiana — Cum-ing-ĭ-a′-na (Cuming's). This is synonymous with *L. Patersoni.*

L. cycadoides—cyc-ad-ŏ-i′-dēs (Cycas-like). A variety of *L. Boryana.*

L. Dalgairnsiæ — Dal-gairn′-sĭ-æ (Miss Dalgairns'). A variety of *L. Boryana.*

L. Deplanchei—De-plan′-chĕ-i (Deplanche's), *Baker.*

A stove species, of medium dimensions, native of New Caledonia, with somewhat spear-shaped barren fronds 1ft. to 1¼ft. long, 2in. to 2½in. broad above the middle, very gradually narrowed all through the lower half, and cut down nearly or quite to the midrib into numerous leaflets of a rigidly leathery texture and dark green colour. The central leaflets are 1¼in. to 1½in. long and ½in. broad, while the twelve or fifteen lowest on each side are less than ½in. long. The stalks on which the barren fronds are borne are 2in. to 3in. long, and are clothed with dark brown scales of a rough nature. The fertile fronds, furnished with ascending leaflets 2½in. long and distantly placed, are borne on much longer stalks.—*Hooker*, *Synopsis Filicum*, p. 481.

L. discolor—dis′-col-or (two-coloured), *Willdenow.*

This thoroughly distinct and beautiful, greenhouse species, native of Australia, Tasmania, and New Zealand, where it is very abundant, forms a short, thick stem or trunk of a tough, woody nature, bearing a massive crown of gracefully-arching fronds. The barren ones are borne on strong, black stalks 3in. to 6in. long, densely clothed at the base with long, dark scales ; they are 1ft. to 3ft. long, 4in. to 6in. broad, and gradually narrowed at the base. The numerous leaflets, 2in. to 3in. long and about ½in. broad, are cut down nearly to the midrib, suddenly narrowed towards the point, and wavy on their margin ; they are of a leathery texture, rich green above, and pale whitish-green beneath. As is usual among Lomarias, the fertile fronds are entirely different from the barren ones, but in this

case they are furnished with numerous narrower and shorter leaflets, which, instead of being contracted in their whole length, are like the barren ones at the base of the fertile frond, above which part they are very narrow; they are conspicuously dilated or widened at the base, where they are connected with the midrib, a character which gives the whole plant a unique appearance. — *Hooker*, *Synopsis Filicum*, iii., p. 5. *Nicholson*, *Dictionary of Gardening*, ii., p. 293. *Lowe*, *Ferns British and Exotic*, iv., t. 56.

L. d. bipinnatifida — bip-in-na-tif′-id-a (twice divided nearly to the midrib), *Moore.*

This greenhouse variety, native of South Australia, is undoubtedly one of the most pleasing and attractive of Lomarias in cultivation, not only on account of its light, cheerful colour, equally bright on both sides of the beautifully-cut fronds, which in general appearance resemble those of the Welsh Polypody (*Polypodium vulgare cambricum*), but also owing to its drooping habit and other characteristics perfectly distinct from those of the species to which it is said to be related. It is a somewhat arborescent Fern, of symmetrical habit; its numerous broad barren fronds, which often measure 3ft. in length including their short stalks, and 6in. in breadth, rise evenly from the crown of a short, robust stem, and, spreading outwards in all directions, arch in a graceful manner. Their leaflets are so closely set that the parts overlap each other, and are cut down to the midrib, the outer sub-divisions or segments being much toothed and somewhat crisped, which characters give the fronds an elegant, fringed appearance. The peculiarity attached to this useful Fern is that its so-called fertile fronds are, with very rare exceptions, as sterile as the barren ones themselves, for, although there are in collections plants sufficiently strong to produce late in the summer a set of fronds which have all the outward appearance of being fertile, it has not come to our knowledge that more than one instance of real fructification has been recorded; and, strange to say, the plant that produced the spores, from which a certain quantity of young plants have been raised in this country, became sterile again. The following season it produced as before, and as also do all the other known plants of the same variety, mock-fertile fronds which have their place in the centre of the

crown, where they stand erect and have their leaflets and leafits much contracted. It is to that defect alone that we must attribute the comparative rarity of so valuable a plant in our collections. With the exceptions of a few trunks which were imported direct from Victoria, all the specimens now in commerce must have been propagated from suckers sparingly produced by underground rhizomes, or else from young shoots which are occasionally found along the stem, and which, if detached and laid on a bed of sphagnum, emit roots freely. The young plants raised from spores produced by the plant referred to, having all the characters of the parent, show that if it is only a plumose variety it is of a constant nature, and this form will no doubt soon become more plentiful.

It is advisable to subject *L. d. bipinnatifida* to as little artificial heat as possible, so as to keep it free from the attacks of thrips and red spider, which are particularly fond of it.

L. d. nuda—nu′-da (naked), *R. Brown.*

Although accepted as only a variety of *L. discolor*, this handsome, compact-habited, Australian, greenhouse Fern, often met with in cultivation under the name of *L. falcata* (for which we cannot find any authority), is apparently very distinct from the species to which it is said to be related. Its general appearance, the texture of its foliage, its mode of growth, and the disposition of its fructification, are all different; and there is no doubt that *L. discolor bipinnatifida* is a variety of *L. discolor* only so far that it is a plumose form of *L. d. nuda*, to which it is closely related by its habit, its mode of growth, and also, as has been lately ascertained, its mode of fructification. With the exception of *L. gibba*, which is of more rapid growth, *L. d. nuda* is undoubtedly the most useful Lomaria in a young state for table and room decoration. Its broadly spear-shaped barren fronds are abundantly produced from a central crown, which, with age, forms a short, slender stem or trunk of erect growth and very tough texture: in that respect at least it differs from most members of the genus. These fronds, which are of a gracefully-arching habit, attain from 15in. to 20in. in length; their numerous leaflets, oblong-spear-shaped and of a light green colour, are of a much thinner texture than those of *L. discolor;* and their short and perfectly naked stalks are round, smooth,

and of good substance. In the fertile fronds, which are of similar shape and size to the barren ones, but comparatively thicker and much heavier, the leaflets are contracted, closely set, cut quite down to the rachis (stalk of the leafy portion), and fertile throughout. — *Hooker*, *Synopsis Filicum*, p. 481. *Nicholson*, *Dictionary of Gardening*, ii., p. 294. *Lowe*, *Ferns British and Exotic*, iv., t. 51.

This variety, which is readily propagated by means of spores, and is extensively grown for decoration, has produced several sub-varieties, the best of which, and indeed the only one worth cultivating for its own decorative merits, is the one commonly known as

L. d. n. pulcherrima—pul-cher′-rim-a (very pretty).

A garden name for an ornamental plant with a constitution equally as good as that of the typical Fern from which it no doubt originated. From *L. d. nuda* it differs in having the extremity of each leaflet somewhat crested or forked, and the summit of the frond still more distinctly crested. It should be kept as much as possible from artificial heat, the effects of which are most pernicious to the young growth.

L. diversifolia—di-ver-sif-ol′-ĭ-a (bearing various fronds), *Baker*.

A stove species, native of New Caledonia, with barren fronds 6in. to 8in. long, 3in. to 4in. broad, borne on stout, erect stalks 4in. to 6in. long, of a dark chestnut-brown colour, and scaly at the base. These fronds are of a leathery texture and naked on both surfaces; they are furnished with narrow leaflets spreading horizontally, the largest 1½in. long, less than ½in. broad, cut down throughout half-way to the rachis (stalk of the leafy portion) into egg-shaped lobes, abruptly terminating in a sharp-pointed process. The fertile fronds are borne on a stalk fully 1ft. long, and furnished with very narrow leaflets 3in. to 4in. long and distantly placed. Both kinds of fronds are produced from a stem or trunk densely clothed with long, narrow scales of a dark brown colour.—*Hooker*, *Synopsis Filicum*, p. 181.

L. dura—du′-ra (hard), *Moore*.

A greenhouse or hardy species, also known as *L. rigida*, native of the Chatham Islands. It is allied to *L. lanceolata* and *L. blechnoides*, but differs

from these by the thick, leathery texture of its barren fronds, which are 1ft. or more long, spear-shaped, and furnished with leaflets, the lower ones of which are dwarfed into rounded lobes, the middle ones oblong or nearly sickle-shaped, and the upper ones narrower and more sharply pointed. It is also distinct from the above-named species by its fertile fronds, which are remarkable for their stout, densely-fruited, very crowded leaflets, and for the fringed nature of their indusia.—*J. Smith*, *Ferns British and Foreign*, p. 290. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

L. elongata—e-long-a′-ta (elongated). A variety of *L. Patersoni.*

L. emarginata—e-mar-gin-a′-ta (notched at the apex). A synonym of *L. opaca.*

L. falcata—fal-ca′-ta (sickle-shaped). A synonym of *L. discolor nuda.*

L. filiformis—fi-lif-or′-mis (thread-like), *Cunningham.*

This is a very distinct, greenhouse species, native of New Zealand and Fiji, with broadly spear-shaped barren fronds 1ft. to 2ft. long, 3in. to 4in. broad, borne on distant stalks 1in. to 4in. long, and produced from a stout, climbing rhizome (stem) of a scaly nature. The numerous leaflets are spreading, 2in. to 3in. long, ½in. broad, distinctly stalked, gradually narrowed towards the point, and regularly notched or dented throughout. The fertile fronds are smaller than the barren ones, and egg-shaped; they are composed of numerous leaflets 3in. to 4in. long and very narrow.—*Hooker*, *Species Filicum*, iii., p. 33. *Nicholson*, *Dictionary of Gardening*, ii., p. 296.

L. fluviatilis—fluv-ĭ-a′-til-is (river-loving ?), *Sprengel.*

A most distinct, greenhouse species, native of New Zealand, Tasmania, and South Australia, in general aspect widely different from all other known Lomarias, and easily recognisable by the shape of its leaflets. It is of dwarf, decumbent habit, and although its curious barren fronds, borne on slender stalks 3in. to 4in. long and densely scaly, often measure 1½ft. in length, they are never more than 2in. broad. These fronds are produced from a fleshy crown, which, with age, forms a little trunk 3in. to 4in. high, and is clothed towards the crown with narrow scales of a bright brown colour. They are simply pinnate (only once divided to the midrib) and furnished with oblong, blunt, spreading leaflets, which are

alternate (Fig. 95), the lower ones being more distant. These leaflets, of a peculiarly soft, papery texture and dull green colour, are ciliated (fringed) all round their edges, and covered on both sides with a profusion of reddish, chaffy hairs. The fertile fronds, also simply pinnate, are of a thoroughly upright habit and furnished with narrow, blunt leaflets, distantly placed, the lower ones with more than their own length between their bases.—*Hooker*, *Species Filicum*, ii., p. 34. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

The barren fronds, being of a drooping character, render the plant suitable for growing in hanging baskets of small dimensions. Cultivated in that way, it shows itself to greater perfection; the method is also more beneficial to the plant, for if the fronds are allowed to lie on the ground they get damaged by constant contact with a body naturally moist, and consequently soon become deteriorated.

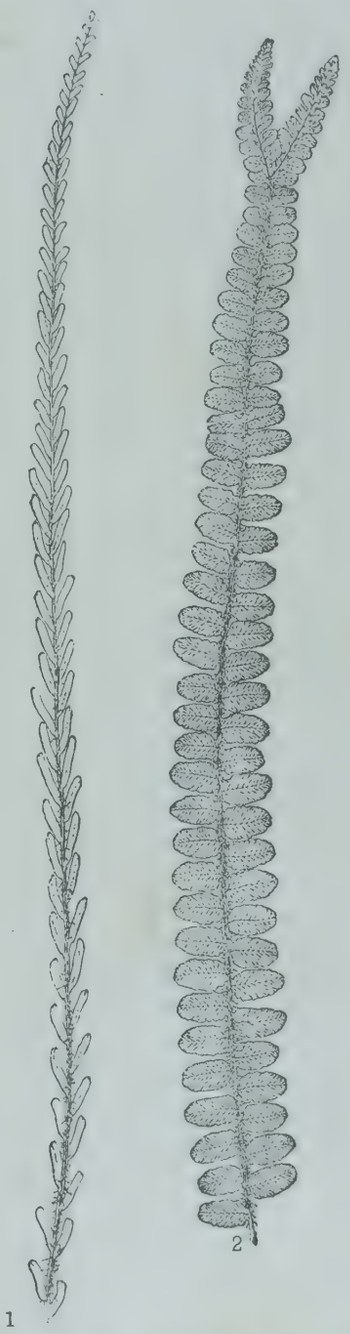


Fig. 95. (1) Fertile and (2) Barren Fronds of Lomaria fluviatilis
(¼ nat. size)

L. Fraseri—Fra′-ser-i (Fraser's), *Cunningham.*

This greenhouse species, native of New Zealand, is dissimilar in habit to any of the other members of the genus, being much more finely divided than any other, and combining a frond like one of our common Lastreas with the fructification of a Lomaria. Although a few years ago it could be found in most of the good collections, and was always considered a favourite on account of the feathery appearance of its fronds, which somewhat resemble those of *Onoclea* (*Struthiopteris*) *germanica*, it is now very seldom met with in cultivation; yet, when grown successfully, hardly any Fern can compete with it for elegance. Its handsome barren fronds, 1ft. to 1½ft. long, 4in. to 6in. broad, and borne on strong, erect, scaly stalks 4in. to 6in. long, are produced from a tough, wiry crown

which in time forms a small stem or trunk, densely clothed with long, narrow, dark brown scales at the crown. They are bipinnatifid (twice divided nearly to the midrib), and are furnished with narrow-spear-shaped leaflets of a soft, papery texture, the lower ones 2in. to 3in. long and ½in. to ¾in. broad, cut down very nearly to the rachis into narrow-oblong, sharp-pointed, slightly-toothed leafits. Both kinds of fronds in this interesting species are similar in shape, size, and cutting; the only noticeable difference between them is that, while the barren ones are of a bright, glossy, dark green on both surfaces, the fertile ones, of the same colour on their upper surface, are more erect and densely covered with bright red spore masses underneath. This species requires constant moisture at the roots.—*Hooker*, *Species Filicum*, iii., p. 40; *Icones Plantarum*, t. 185. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

L. Germainii—Ger-mai′-nĭ-i (Germain's), *Hooker*.

This pretty, dwarf-growing, greenhouse or hardy species, native of Chili, is more extensively known in gardens and in the trade as *L. crenulata*. In general aspect it much resembles *L. alpina*, but the lower leaflets of its fronds are distinctly separated. It is a slowly-creeping plant with oblong-spear-shaped barren fronds 2in. to 3in. long, about ¾in. broad, produced in great abundance from little wiry rhizomes (prostrate stems) which always remain on the surface of the ground, and borne on short stalks 1in. to 2in. long, densely clothed at the base with pale brown scales. These barren fronds are furnished with sessile (stalkless) leaflets of a stout, leathery texture, blunt and notched, the largest about ½in. long and ⅛in. broad, the lower ones distantly placed and gradually narrowing to mere auricles or lobes. The fertile fronds, which are furnished with leaflets nearly as broad and close as the barren ones, are borne on larger stalks and upright. This interesting little plant may very easily be propagated at almost any time by the division of its rhizomes.—*Hooker*, *Species Filicum*, iii., p. 32, t. 152. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

L. Ghiesbreghtii—Ghies-bregh′-tĭ-i (Ghiesbreght's), *Baker*.

A small-growing, stove species, native of Chiapas, South Mexico. Its small, somewhat spear-shaped barren fronds, 3in. to 6in. long and ½in. to

1in. broad, are produced from a short-creeping rhizome (prostrate stem) that is densely clothed with large, spear-shaped, brown scales, and are borne on nearly black stalks 1in. or less in length ; the leaflets are of a somewhat leathery texture, dull green in colour, somewhat strap-shaped, blunt or slightly pointed, closely set, and enlarged at the base. The fertile fronds are quite as large as the barren ones, are furnished with distant, narrowly sickle-shaped leaflets, and are borne on much longer stalks. — *Hooker*, *Synopsis Filicum*, p. 481.

L. gibba—gib′-ba (gibbous, swollen), *Labillardiere.*

This well-known, stove or greenhouse species, native of New Caledonia, Aneiteum, and the Isle of Pines, is remarkable principally on account of the symmetrical and pleasing form of its growth, which is very rapid : indeed, it is probably owing to this last-named quality, and also to the fact that the plant is easily raised from spores and quickly grown in heat, where it does not object to moisture overhead, that *L. gibba* has become such a popular and widely-cultivated plant. Its elegant barren fronds, 2ft. to 3ft. long and 6in. broad, are deeply pinnatifid, their leaflets being cut down nearly to the rachis (stalk of the leafy portion), but dilated and connected at the base ; in the centre of the frond they are 2in. to 3in. long, but the lower ones grow shorter very gradually ; all are of a bright shining green colour and of a leathery texture. In the fertile fronds, the leaflets are narrow and contracted, and the sori (spore masses) occupy the whole space between the edge and the midrib. Both kinds of fronds are borne on short, strong, upright stalks densely clothed below with long, narrow, black scales, and produced from a fleshy crown which in course of time forms a stem or trunk 4ft. or even 5ft. in height. These fronds, which are of a somewhat erect habit when the plant is still in a young state, become more pendulous as the specimen gets older, and are of a very elegant, arching habit when the trunk is formed. — *Hooker*, *Species Filicum*, iii., p. 5. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

L. gibba is certainly the most useful Lomaria in cultivation for decorative purposes, as may be inferred from the enormous quantities which every season find their way to the flower markets and florists' shops. In the young state especially they are found invaluable for dinner-table decoration,

competing even with the most elegant Palms and other plants of graceful habit. Besides being used as a decorative plant, *L. gibba* is also remarkably well adapted for exhibition purposes, as it makes splendid specimens 4ft. to 5ft. across, and, being so regular in growth, is perfectly distinct from all other Ferns.

Considering the extent to which this species is grown, it is surprising to find so few variations worth noticing amongst the numberless seedlings raised every year. It is true that some of these are much coarser growers and more relaxed in habit than the typical plant, in which the fertile fronds are but sparingly produced, whereas they are abundant in the majority of garden-raised subjects ; but even these are not permanent characters. The only distinct and acknowledged varieties produced under cultivation are the following :

L. g. Bellii—Bel′-lĭ-i (Bell's), *Moore.*

This variety, found among some seedlings in a London nursery (Osborn's, we believe), is most effective and beautiful on account of its fronds, which are in all respects as handsome as those of the typical species, being furnished at their extremities with dense tassels and having the points of all their leaflets provided with crests of a smaller size. Although a very good grower, it remains very rare on account of the slow process of propagation : being a naturally barren plant, it can only be increased by offsets, which are now and then, but never plentifully, produced along the stem, and which, when detached and carefully tended, soon make little plants, always partaking of the characters peculiar to the mother plant.—*Nicholson, Dictionary of Gardening*, ii., p. 294.

L. g. crispa—cris′-pa (crisp, curled), *Moore.*

In this form, of close and compact habit and of small dimensions, which reproduces itself true from spores, the very pretty fronds, of an upright and somewhat stiff habit, seldom reach more than 8in. in height, and are disposed in a symmetrical, shuttlecock fashion ; they are pinnate (once divided to the midrib), extremely dense, and beautifully curled at the margins. The whole plant is of a deep sea-green colour. This variety thrives best under greenhouse treatment.

L. g. platyptera—plat-yp′-ter-a (broadly winged), *Moore.*

This is a Fern of gigantic dimensions, its handsome fronds frequently attaining 3ft. in length. Although given by Moore as a variety of *L. gibba*, it has all the appearance of a Blechnum, as on the mock-fertile fronds, which never produce any spores, the false fructification is disposed on each

Fig. 96. Lomaria gibba platyptera
(much reduced).

side of the midvein and does not form a separate frond. It is permanently barren, and has been produced several times by sowing together spores of *L. gibba* and *Blechnum brasiliense.* See Fig. 96.

L. g. robusta—ro-bus′-ta (robust), *Moore.*

A garden form, of more robust habit than the typical plant. Its massive yet elegant fronds are produced in abundance from a central crown

(Fig. 97); although of the same length, they are much broader than those of *L. gibba*, and their leaflets are prettily undulated and smooth on the margins. The short stalks are, like those of the species, of a scaly nature. This variety does not reproduce itself true from spores, a small percentage only of the seedlings retaining the distinctive characters. — *Nicholson, Dictionary of Gardening*, ii., p. 294.

Fig. 97. Lomaria gibba robusta (much reduced).

L. g. rosea–ros′-ĕ-a (rosy), *May.*

In this handsome variety, also known in commerce under the name of *L. g. tincta*, the principal attraction and most distinctive character resides in the lovely pinkish or rosy colour with which its fronds when in a young state are adorned, and which is equal in intensity to that observed in certain Adiantums. It is of much more erect habit than the species, its central fronds standing almost perpendicular, while the lower ones are of a slightly drooping nature only. The leaflets are narrower and more pointed than those of either the species or the other varieties. The stalks are scaly, and the rachis (stalk of the leafy portion) is of a bright chestnut-brown colour and glossy. This variety reproduces itself freely from spores.

L. g. tincta—tinc′-ta (tinged). A synonym of *L. g. rosea.*

L. gigantea—gig-ant-e′-a (gigantic). A synonym of *L. attenuata.* It must not be confounded with *L. ciliata gigantea.*

L. Gilliesii—Gil-lies′-ĭ-i (Gillies'). A variety of *L. procera.*

L. (Plagiogyria) glauca—Plag-ĭ-og-y′-rĭ-a ; glau′-ca (bluish-green), *Blume.*

This pretty, stove species, of medium growth, readily distinguishable by the silvery whiteness of the under-side of its fronds, is a native of

Java and Khasya, where it grows at an elevation of 6000ft. Its egg-shaped fronds, borne on naked, upright stalks 1ft. long, are from 1ft. to 2ft. in length, 6in. to 9in. in breadth, and furnished with leaflets of a leathery texture, 3in. to 5in. long, about ½in. broad, gradually and sharply narrowed towards the point, and narrowed also on both sides at the base, where they become contiguous. The fertile fronds are of similar size and shape, but their leaflets are contracted and distantly placed, not connected at the base.—*Hooker*, *Species Filicum*, iii., p. 22.

L. lanceolata—lan-cĕ-ol-a′-ta (spear-shaped), *Sprengel.*

An exceedingly pretty, evergreen, greenhouse species, native of New Zealand, Tasmania, Australia, and the Polynesian Islands, and one which is particularly attractive on account of its dwarf and compact habit, as well as through the lively colour of its young barren fronds, which are beautifully ornamented by the bright orange-red coloured rachis (stalk) which runs through their centre. The barren fronds are 6in. to 12in. long, 2in. to 4in. broad, borne on dark brown stalks 4in. to 6in. long, and abundantly produced from a close, fleshy crown. The closely-set leaflets, of a leathery texture and bright green colour, are somewhat sickle-shaped, gradually narrowed to a point, slightly toothed, and smooth on both sides. The fertile fronds, which are distinctly pinnate (divided to the midrib), of a more upright habit, and seldom more than 3in. long, are furnished with contracted, sickle-shaped leaflets about ⅛in. apart at the base.—*Hooker*, *Species Filicum*, iii., p. 11; *Icones Plantarum*, t. 429. *Nicholson*, *Dictionary of Gardening*, ii., p. 294. *Lowe*, *Ferns British and Exotic*, iv., t. 61.

L. Lenormandi—Len-or′-mand-i (Lenormand's), *Baker.*

A stove species, of medium growth, native of New Caledonia, with barren fronds oblong-spear-shaped, 1ft. to 1½ft. long, 6in. to 8in. broad, and borne on strong, upright stalks 4in. to 6in. long, densely clothed with long, narrow, hair-like scales of a brown colour. The numerous leaflets, 3in. to 4in. long, about ½in. broad, and of a soft, papery texture, are cut very nearly to the rachis (stalk of the leafy portion) into finely-toothed, linear-falcate (narrow-sickle-shaped) leafits, the lower ones growing

shorter very gradually. The leaflets of the fertile fronds are very numerous, narrowly linear, quite entire, 2in. to 3in. long, and set ¼in. apart.—*Hooker*, *Synopsis Filicum*, p. 181.

L. L'Herminieri—L'Her-min-ĭ-e′-ri (L'Herminier's), *Bory*.

This very handsome, stove species, of small dimensions, native of Tropical America, its habitat extending from the West Indies and Columbia southward to Chili, is as distinct as it is beautiful. Although not really an arborescent kind, it nevertheless forms a slender, wiry stem or trunk, densely clothed with narrow, dark brown scales, on which its prettily-coloured fronds are very closely set, forming plants of a very compact habit and somewhat pyramidal in shape. The barren fronds, which are broadly spear-shaped, 9in. to 15in. long, and 3in. to 4in. broad, are very numerous and disposed in a somewhat erect position, which, on account of their stiff, leathery texture, they retain as long as they remain on the plant. They are furnished with leaflets about 2in. long, ½in. broad, and rounded or somewhat blunt at the extremity; a few of the lower ones are suddenly cut down into mere auricles. The fertile fronds are distinctly pinnate (divided to the midrib); the narrow leaflets are cut down quite to the rachis (stalk of the leafy portion), the lower ones being ½in. to 1in. apart at the base.—*Hooker*, *Species Filicum*, iii., p. 9; *Garden Ferns*, t. 40. *Nicholson*, *Dictionary of Gardening*, ii., p. 294. *Lowe*, *Ferns British and Exotic*, iv., t. 63.

L. L'Herminieri is a most attractive Fern, as its foliage when young is of a beautiful crimson colour, changing with age to a dark glossy green. It is, unfortunately, not very common in collections, although now and then fine specimens may be seen in which several shoots have started at different intervals from the side of the main trunk, and developed so as to form a four- or six-branched plant, which is then very decorative. Besides being one of the Lomarias most sensitive to moisture on the fronds, it is also one requiring peat and sand only to thrive well, as loam, unless very light and fibrous, is injurious to its roots.

L. longifolia — lon-gif-ol′-ĭ-a (long-fronded). This is identical with *L. procera ornifolia*.

L. magellanica — mag-el-lan′-ic-a (from Magellan). Synonymous with *L. Boryana.*

L. membranacea—mem-bra-na′-cĕ-a (parchment-like), *Colenso.*

A singular and very interesting, greenhouse species, intermediate in habit between *L. fluviatilis* and *L. lanceolata*, and a native of New Zealand. Its barren fronds, narrow-oblong in shape, 6in. to 9in. long, 1in. to 1½in. broad, and borne on very short stalks, are produced from a short stem clothed with narrow, dark brown scales. Their leaflets, of a leathery texture, narrow-oblong, blunt, and notched, are quite distinct at the base, though connected, the lowest being gradually reduced to mere auricles. The fertile fronds, which have narrow and distantly-placed leaflets, are borne on a stalk several inches long.—*Hooker*, *Species Filicum*, iii., p. 34, t. 145.

L. nigra—nig′-ra (black), *Colenso.*

This greenhouse species, native of New Zealand, is a very distinct plant, of soft, papery texture. Its barren fronds, 4in. to 6in. long, 1in. to 1½in. broad, and borne on slender, erect stalks 2in. to 3in. long and densely scaly, are formed of a large terminal portion, bluntish and sinuated (lobed) only, and several pairs of roundish-oblong, dark green leaflets ½in. to ¼in. long, ¼in. to ½in. broad, the lower ones quite distinct and disposed at a short distance from one another. The fertile fronds are borne on longer stalks than the barren ones; they are composed of a long and narrow terminal leaflet and a few lateral ones, also narrow and contracted.—*Hooker*, *Species Filicum*, iii., p. 35; *Icones Plantarum*, t. 960. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

L. nuda—nu′-da (naked). A variety of *L. discolor.*

L. onocleoides—on-oc-lĕ-ŏ-i′-dēs (Onoclea-like), *Sprengel.*

This beautiful, distinct, evergreen, stove species, native of the West Indies and Ecuador, is now becoming rare in cultivation. Its handsome and gracefully-arching barren fronds (Fig. 98), 1ft. to 1½ft. long, 1in. to 2in. broad, are spear-shaped and very gradually narrowed below. Their leaflets, of a very leathery texture and shining on their dark green upper surface, are closely set; they are 1in. or less in length, scarcely ½in. broad, dilated at the

base, and gradually narrowed towards the point. The fertile fronds are widely distinct, being sometimes wholly contracted and completely covered with fructification, whereas in other cases their upper and lower parts remain barren, and some of the leaflets in the middle of the frond only become fertile, being thus similar to the fertile fronds of *Osmunda javanica* and of *O. Claytoniana* (*interrupta*). At other times, again, their lower part only is contracted and fertile, while their upper portion is as broad as in the barren fronds. Both kinds of fronds are produced from a long, creeping rhizome (prostrate stem) densely clothed with narrow scales of a chestnut-brown colour, and borne on stiff, upright stalks, those of the barren fronds being 3in. to 4in. long and those of the fertile ones a little longer.—*Hooker*, *Species Filicum*, iii., p. 10, t. 146. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

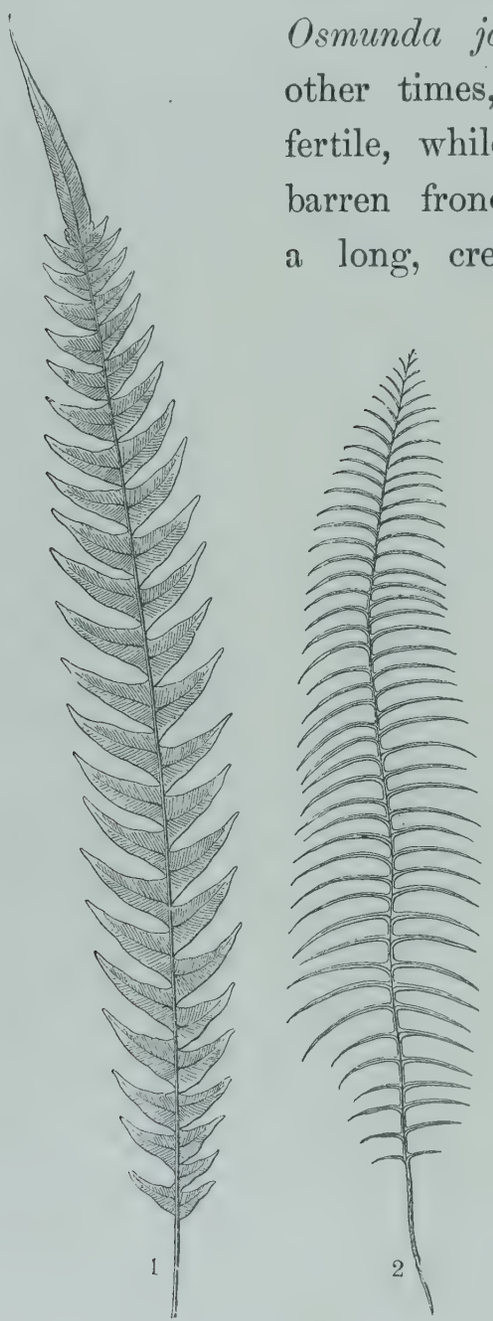


Fig. 98. (1) Barren and (2) Fertile Fronds of Lomaria onocleoides
(⅛ nat. size).

L. opaca—op-a′-ca (dull), *Baker*.

A stove species, native of Aneiteum and New Caledonia. Its stem is ascending, and is densely clothed at the crown with narrow, dark brown scales. The barren fronds, 6in. to 12in. long and 4in. to 6in. broad, are very gradually narrowed below. They are furnished with numerous narrow-oblong leaflets, 1in. to 2in. long, dilated and connected at the base and closely set, bluntly rounded, and slightly notched at their summit. The texture is thick and leathery, and the colour dull green. The leaflets in the fertile fronds are very narrow and distantly placed. Mettenius compares the habit of this plant with that of *L. nigra*. *L. emarginata* of Carruthers is identical with *L. opaca*.—*Hooker*, *Synopsis Filicum*, p. 176.

L. ornifolia—or-nif-ol-ĭ-a (Ash-leaved). A variety of *L. procera*.

L. Patersoni—Pat-er-so′-ni (Paterson's), *Sprengel.*

This essentially distinct, greenhouse species, of dwarf habit and peculiar appearance, is also known as *L. Cumingiana;* it has a wide range of habitat, being found in a wild state in South Australia, Tasmania, and the Philippine Islands. The barren fronds, usually simple (undivided) or occasionally, especially when the plant is growing vigorously, pinnatifid (divided nearly to the midrib), are about 1ft. long, less than 1in. broad, broadest one-third of the distance from the top, and very gradually narrowed downwards; their extremity is sharply pointed and their margin slightly wavy. They are borne on wiry, erect stalks 2in. to 3in. long, and, being placed several deep and all round the crown of a short-creeping rhizome (prostrate stem), they form a thick and handsome mass of foliage of a dark green colour, the whole relieved by numerous young fronds, which are to be found among them at almost any time of the year, and which for a long period remain of a beautiful metallic hue. The fertile fronds, of about the same length as the barren ones, are only about $\frac{1}{8}$in. broad, the sori (spore masses) occupying the whole space between the midrib and the margin. This species thrives best when planted out in a rockery.—*Hooker, Species Filicum*, iii., p. 3; *Filices Exoticæ*, t. 49. *Lowe, Ferns British and Exotic*, iv., t. 50.

L. P. elongata—e-long-a′-ta (lengthened), *Blume.*

A variety in which both fertile and barren fronds are pinnatifid (cut nearly to the midrib). It is also known as *L. Colensoi* and *L. punctata*, and is a native of New Zealand, Fiji, Ceylon, and the Neilgherries, where, according to Beddome, it is very abundant in most of the Sholas on the Koonah Mountains and in the Shola behind the Avalanche Bungalow; also in the Sisparah Ghat, in all the ravines above 4000ft. elevation. Both kinds of fronds are about 2ft. long, the barren ones divided into six to nine leaflets on each side, which are often 6in. to 9in. long, nearly 1in. broad, and suddenly decurrent (running down) at the base. In the fertile fronds, the leaflets are often numerous on each side; some fronds have their upper and some of their lower leaflets fructified while the other leaflets are sterile and leafy; in other cases only portions of the fertile fronds bear spores.—*Hooker, Synopsis Filicum*, p. 174. *Nicholson, Dictionary of Gardening*, ii., p. 294. *Beddome, Ferns of Southern India*, t. 28.

L. Plumieri—Plu-mĭ-e′-ri (Plumier's), *Desvaux.*

A stove species, of large dimensions, native of Tropical America, where it is said to be abundant and to extend from the West Indies and Columbia southward to Rio Janeiro and Peru. Its massive, oblong-spear-shaped barren fronds, 2ft. to 3ft. long and 9in. to 12in. broad, are abruptly terminated at the base; they are furnished with numerous and somewhat leathery, spreading leaflets 4in. to 6in. long, ½in. to ¾in. broad, cut down very nearly to the base, with flat edges, and sharp-pointed at their extremity. In some of the forms the leaflets are nearly equal at the base: in others they are few in number and conspicuously dilated. In the fertile fronds, the leaflets, often variously curved and dilated at the base, are 4in. to 6in. long and only ⅛in. broad.—*Hooker, Species Filicum*, iii. p. 7.

Fig. 99. Barren Frond of Lomaria procera (⅛ nat. size).

L. procera—pro-ce′-ra (tall), *Sprengel.*

This very handsome, greenhouse species, of large dimensions and much given to variation, is a plant with a very wide range of habitat, being found in Mexico and the West Indies southward to Chili; in the Malayan and Polynesian Islands; in New Zealand, South Australia, Tasmania, and South Africa. According to their various habitats, these forms or variations are of a more or less hardy constitution, some being well adapted for growing outside and unprotected in many parts of the West of England. In the typical species, the barren fronds, which are divided quite to the midrib (Fig. 99), are borne on stout, upright stalks, 6in. to 12in. long and

scaly below, and produced from a stout, elongated stem of a woody nature, clothed with large, egg-shaped scales of a rusty-brown colour. These barren fronds are broadly egg-shaped, 1ft. to 3ft. long, 6in. to 12in. broad, and furnished with leaflets of a leathery texture and dark green colour, 3in. to 6in. long, ½in. to 1in. broad, the lower ones stalked, the others sessile (stalkless), rounded or even cordate (heart-shaped) at the base, sometimes auricled (eared), narrowed at the apex, and sometimes slightly toothed on the margins. The fertile fronds have narrow and much-contracted leaflets 4in. to 6in. long and only ¼in. broad, distantly placed on each side of the midrib. It often happens that the same frond is partially barren and partially fertile, and there is, it is said, a form that has the barren leaflets slightly pinnatifid (divided part of the way to the midrib). Considering its robust constitution and the massive and stately habit of its gracefully-arching fronds, *L. procera* is not grown as extensively as it really deserves.—*Hooker*, *Species Filicum*, iii., p. 23; *Garden Ferns*, t. 53. *Nicholson*, *Dictionary of Gardening*, ii., p. 294. *Lowe*, *Ferns British and Exotic*, iv., t. 55.

Many Ferns which have hitherto been regarded as distinct species, but which are only varieties of *L. procera*, owing their distinctive characters to their habitat only, are to be found in commerce under specific names. The following are the most important:

L. p. capensis—ca-pen′-sis (from the Cape of Good Hope), *Willdenow.*

A strong-growing and somewhat coarse-looking Fern, from South Africa, with handsome, pinnate (once-divided), spear-shaped barren fronds of large dimensions and of a peculiarly dark green colour. It is an extremely ornamental Fern, especially when planted out in the rockery in a prominent place, where there is sufficient room to allow for the full development of its barren fronds, which sometimes measure 2½ft. in length, and of its fertile ones, which, although much contracted, attain about the same dimensions.—*Hooker*, *Synopsis Filicum*, p. 179. *Lowe*, *Ferns British and Exotic*, iv., tt. 59 and 60.

L. p. chilensis—chil-en′-sis (Chilian), *Kaulfuss.*

This truly majestic Fern, as its name implies, is a native of Chili, where it grows naturally at high elevations and in comparatively cold

habitats. It is undoubtedly one of the most ornamental kinds comprised in the genus, and one which is very showy when planted out on cool rockwork, in a rich, open soil, where its underground rhizomes (stems) can run freely and produce a quantity of young plants in all directions, by which means it is easily propagated. Its beautiful, pinnate (once-divided) fronds are produced from a decumbent stem or trunk of a fleshy nature, and have a gracefully arching habit, although of a very tough, parchment-like texture, and borne on long, stiff stalks of a reddish colour—characters by which it is readily distinguished from the other forms of *L. procera*. It is not an arborescent kind: on the contrary, the trunk generally creeps on the surface of the ground without even making an attempt at taking an upright or even oblique position. It is, however, a gigantic-growing Fern, as its barren fronds, which are of a very dark green colour, often attain 4ft. and even 5ft. in length, inclusive of their stalks. The fertile fronds, seldom more than 2½ft. high, are of erect habit, and are furnished with contracted leaflets set a little distance apart and usually more or less curved. Although it has been known in many favoured situations to stand the rigour of our winters unprotected, this variety is, nevertheless, better adapted for the cool greenhouse.—*Hooker*, *Synopsis Filicum*, p. 179. *Nicholson*, *Dictionary of Gardening*, ii., p. 293.

L. p. Duttoni—Dut′-ton-i (Dutton's), *Dutton*.

This exceedingly elegant variety, not yet in commerce, was originally found by Mr. John Dutton, of Christ Church, New Zealand, who informs us that he has had the plant in his collection for twelve years, during which time it has proved constant, but, unfortunately, also quite barren, so that its propagation has only been effected by means of the stolons (underground offsets), which, like the typical species, it produces sparingly. The chief points of difference, as compared with *L. procera*, are the more leafy character of the barren fronds, the long, narrow, whip-like leaflets of the mock-fertile fronds, which are produced in unusual abundance and disposed in the centre of the plant, and the absence of fructification. The last point is very interesting, as these fronds present much the same appearance as do the fertile fronds of the type, but are wholly sterile. For the above information we are indebted to the Editors of the *Gardeners' Magazine*.

L. p. Gilliesii—Gil-lies′-ĭ-i (Gillies'), *Hooker and Greville.*

A pretty, evergreen, greenhouse Fern, native of Chili and Brazil, and one which is by amateurs frequently mistaken for the previously described *L. p. chilensis;* but it only resembles that plant in its tough, parchment-like texture, all other characters being essentially different. Unlike *L. p. chilensis*, it forms a short, upright stem or trunk, from which the pinnate (once-divided) barren fronds are produced. These, instead of being of an arching habit, are of a somewhat rigid appearance, much shorter, seldom exceeding 2ft. in length, and have their leaflets set much more closely. The stalks also differ in colour, for they are light green in this case, whereas those of *L. p. chilensis* are of a red hue and also much longer. The fertile fronds, also pinnate and upright, are furnished with leaflets which usually have only their lower half contracted and fertile, the upper half of each being barren and somewhat spathulate (spoon-shaped)—a character which, however, is sometimes also met with in *L. p. chilensis.*—*Lowe*, *Ferns British and Exotic*, iv., t. 54.

L. p. ornifolia—or-nif-ol′-ĭ-a (Ash-leaved), *Presl.*

A strong-growing variety, which produces fronds 3ft. long, furnished with as many as forty leaflets, the lower ones distinctly stalked and frequently furnished with glands at the base of their petioles (small stalks). *L. longifolia* of Schlechtendahl, *L. spectabilis* of Liebman, and *L. tuberculata* of J. Smith are identical with this variety.—*Hooker*, *Synopsis Filicum*, p. 197. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

L. p. vestita—ves-ti′-ta (clothed), *Blume.*

A form of large dimensions, distinguished from the others through the nature of its rachis (stalk of the leafy portion), which, like the stalks on which the fronds are borne, is densely clothed with brown scales.—*Nicholson*, *Dictionary of Gardening*, ii., p. 294.

L. pumila—pu′-mil-a (dwarf), *Raoul.*

A very pretty, greenhouse species, native of New Zealand, and one which somewhat resembles the better-known *L. alpina*, but it is much more delicate in texture and has its leaflets distinctly notched. Its small barren fronds,

3in. to 4in. long, ½in. broad, and spear-shaped, are abundantly produced from a slender, creeping rhizome (prostrate stem) clothed at its summit with bluntish scales of a bright rusty-brown colour, and borne on stalks about 1in. long. The spreading leaflets, linear-oblong in shape and of a soft, papery texture, are blunt at their extremity and distinctly crenate. The fertile fronds, borne on a stalk 3in. to 4in. long, are of erect habit and furnished with narrow-oblong leaflets having a considerable space between them.—*Hooker*, *Species Filicum*, iii., p. 18. *Nicholson*, *Dictionary of Gardening*, ii., p. 294.

L. punctata—punc-ta′-ta (dotted). Synonymous with *L. Patersoni elongata.*

L. punctulata—punc-tul-a′-ta (dotted), *Kunze.*

This is a singular and interesting, greenhouse species, native of South Africa, from Natal southward, and Java. Its barren fronds, oblong-spear-shaped, 1ft. to 2ft. long, and 4in. to 6in. broad, are produced from a stout stem densely scaly at the crown, and borne on erect stalks 3in. to 6in. long. The narrow, somewhat sickle-shaped leaflets are very numerous; they measure 2in. to 3in. in length and ¼in. in breadth, are rounded or cordate (heart-shaped) and auricled (eared) at their base, the lower ones deflexed, and the lowest reduced to mere lobes. The fertile fronds are usually similar in shape and size, but their leaflets are seldom more than ⅛in. in breadth. This species has sometimes the fructification of a Lomaria and sometimes that of a Blechnum. The most surprising abnormal form, however, is that which is figured in the "Botanical Magazine" (t. 4768) under the name of *Scolopendrium Krebsii*, in which every leaflet has a large number of parallel rows of fructification extending from the midrib towards the edge, at an acute angle with the former; but it does not possess the slightest outward sign or character of a Scolopendrium.—*Hooker*, *Species Filicum*, iii., p. 31. *Nicholson*, *Dictionary of Gardening*, ii., p. 294. *Lowe*, *Ferns British and Exotic*, iv., t. 53.

L. punctulata is an easily-grown plant which requires thorough drainage, stagnation at the roots being particularly injurious to it. Its fronds are very valuable for decoration, as they retain their freshness for a long time when cut and kept in water.

L. rigida—rig′-id-a (stiff). Synonymous with *L. dura.*

L. robusta — ro-bus′-ta (strong). A name applied to varieties of *L. Boryana* and *L. gibba.*

L. (Plagiogyria) semicordata—Plag-ĭ-og-y′-rĭ-a ; se-mic-or-da′-ta (half heart-shaped), *Baker.*

A stove species, of medium dimensions, native of Tropical America, its habitat extending from Mexico to Peru and South Brazil. Its broadly spear-shaped barren fronds, 1ft. to 2ft. long and 4in. to 6in. broad, are borne on erect, naked stalks 3in. to 6in. long, dilated (widened) and winged at the base, and produced from a short, upright stem. The numerous leaflets, 3in. to 4in. long and little more than ¼in. broad, are somewhat cordate (heart-shaped) at the base and gradually narrowed at the point. They are of a somewhat leathery texture, finely serrated (toothed like a saw) throughout, and the lower ones are deflexed (thrown back). The fertile fronds are similar in shape and size, but their very narrow leaflets are more distantly placed.—*Hooker, Species Filicum*, iii., p. 19.

L. spectabilis — spec-ta′-bil-is (showy). A synonym of *L. procera ornifolia.*

L. Spicant—Spi′-cant (spiked), *Desvaux.*

Although a thoroughly British plant, the "Hard Fern," as this species is popularly called, and which is also known as *Blechnum boreale* and *B. Spicant*, is of a most cosmopolitan character, being found in nearly every part of the world. Besides growing wild throughout Europe, from the Arctic regions to Madeira and Crete, it is also found in the Caucasus, Kamtschatka, Japan, the Cape of Good Hope, &c. It is plentiful in North America, where, according to Eaton, it grows on the ground in dense forests, sometimes in open places from Mendocino County, California, to Oregon, British Columbia, and Sitka ; but nowhere is it met with in such abundance as in the British Islands, notably in St. Faith's, Newton Woods, near Norwich ; at Bromsgrove Lickey, in Worcestershire ; at the bottom of the thicket in the Vale of Dudecombe, near Painswick ; at Hainsford, in Norfolk ; in Anglesey, in various parts of Hertfordshire, and in the Northern counties. It is also spread all over Ireland, but principally in the counties

of Wicklow and Clare. The Hard Fern is also found growing luxuriantly in Cumberland at an elevation of 700ft. to 800ft. above sea-level; but in Aberdeenshire it occurs on the Cairngorm Mountains at much higher altitudes, varying probably from 1000ft. to 1200ft. Gerarde, in his "Herbal," says: "It groweth in most parts of England, but especially on a heath by London, called Hampstead Heath, where it groweth in great abundance." However abundant it may have been in that locality in Gerarde's time, it is now extinct there.

The Hard Fern is one of the commonest of our evergreen species, and its striking dwarf and sturdy habit, as well as the deep green colour of its barren fronds, renders it one of the most useful plants for the decoration of the outdoor rockery, where, in a moist, shady nook, it forms a beautiful and most conspicuous object. *L. Spicant* is one of the least fastidious of all our British Ferns, for, although it prefers a moist situation with a northern aspect, it also succeeds in a stiff, clayey soil, and when exposed to the more or less direct rays of the sun. If it has its preferences, the Hard Fern, according to the authority of some thoroughly practical men, has also one very decided antipathy — it dislikes lime in any form. Messrs. A. Stansfield and Son, of Todmorden, Lancashire, who for many years have made a speciality of the culture of hardy Ferns, and whose name in connection with that interesting class of plants is generally associated with those of eminent men like Clapham, Ivery, Lowe, Moore, Sim, Wollaston, &c., referring in their catalogue to the antipathy of this Fern towards limestone, give it as their opinion that "lime appears to be as injurious to *Lomaria Spicant* among Ferns as it is to the common Ling among flowering plants," and add: "Lime in all its forms, therefore, should be avoided; even water containing lime should not be used." A fact of primary importance, and one which may be taken as a safe guide in its cultivation, is that in its wild state the plant is found in perhaps a greater variety of soils and situations than any other native Fern. The compost in which the Hard Fern and its varieties grow most luxuriantly is one made of loam, peat, leaf mould, and sand, in equal parts. In planting, it is found most beneficial to intermix, if possible, some fragments of broken sandstone with the compost, which is thus rendered more permeable, although retaining at the same time its permanently moist nature. It is in great request for the

hardy Fernery, but, like some others of our British Ferns, it may with great advantage be also used for the decoration of the greenhouse and conservatory: under such conditions its fronds, which are extremely useful in a cut state for mixing with cut flowers, retain their stiffness all through the winter. Some very handsome specimens of this species, in 5in. pots, have lately been produced in quantities by our market-growers for winter decoration; this, however, is not by any means a new notion, as more than thirty years ago, a writer in "The Cottage Gardener," vol. xv., p. 261, said: "Having grown *L. Spicant* to a great extent, I can say confidently that it will grow, and that, too, most luxuriantly, in a greenhouse. I have had plants of it in 8½in. pots throw out eighty-three fronds, fourteen of which were fertile; and it was that, and a fine plant of *Scolopendrium undulatum*, that attracted the notice of most visitors, for they were really noble plants."

The commonest, as also the most reliable, method employed for increasing the varieties of the Hard Fern is the division of the crowns, as very little dependence can be placed on their exactly reproducing the varieties in any other way. The species is readily propagated by means of spores, which are usually ripe about September.

L. Spicant has produced, naturally and also through cultivation, many very interesting varieties, the most distinct and the most attractive of which well deserve special attention at the hands of all Fern-growers, the more so that in hardiness and decorative qualities they are equal to the species from which they are issue. They are too numerous to be all described here; in a list published in March, 1865, Mr. P. Neill Fraser, of Cannonmills Lodge, Edinburgh, enumerates seventy-eight more or less distinct kinds in his possession. We have limited ourselves to the most striking only, the descriptions of which follow:

Fig. 100. Crest of Lomaria Spicant Aitkiniana (much reduced).

L. S. Aitkiniana—Ait-kin-ĭ-a′-na (Aitkin's), *Stansfield.*

A remarkable variety, found in the West of Ireland in 1872. Its fronds, both barren and fertile, terminate in huge, crested and branched heads (Fig. 100), but its true character is not shown until it attains a certain size.

L. S. anomala—an-o′-mal-a (anomalous), *Lowe.*

An extraordinary variety, novel and distinct in general appearance. Its fronds, about 9in. long, are of thin texture and much attenuated; their narrow, arching leaflets, without being so much contracted as usual, are all partially fertile, the sori (spore masses) being produced here and there without any distinction between barren and fertile fronds. It was found at Walsden, in Lancashire; near Loch Alsh, in Ross-shire; and at Birker Force, in Cumberland.—*Lowe, Our Native Ferns*, ii., p. 383, fig. 789. *Nicholson, Dictionary of Gardening*, ii., p. 295.

L. S. a. minus—min′-us (small), *Lowe.*

A miniature form of the preceding variety, found at Beddgelert, Carnarvonshire. It is very useful for Fern-cases.—*Nicholson, Dictionary of Gardening*, ii., p. 295.

L. S. brevifrons—brev′-if-rons (short-fronded), *Moore.*

A variety which in general appearance is not at all unlike *L. alpina.* It is a plant of dwarf habit, originally found in the Vale of Todmorden, producing spear-shaped fronds about 5in. long and furnished with broad leaflets, the few lower ones shorter than the others.—*Lowe, Our Native Ferns*, ii., p. 386.

L. S. caudata—cau-da′-ta (tailed), *Lowe.*

This very interesting variety, originally found at Eastwood, produces fronds 6in. to 8in. long, nearly 1in. broad, of a thick, leathery texture, terminating in a long, tail-like process; the basal one-third of the frond is suddenly contracted into rounded lobes.—*Lowe, Our Native Ferns*, ii., p. 396, fig. 810.

L. S. concinna—con-cin′-na (neat), *Lowe.*

A beautiful variety, found in the Valley of Conway and at Barnstaple. Its barren fronds, 6in. to 9in. long, have their lower portion linear (long and narrow), ¼in. to ½in. broad, and furnished with lobes that are nearly round, almost fan-shaped, and beautifully notched on the edges. The fertile fronds, much longer than the barren ones, are little more than

a stalk or midrib, the lobes being reduced into simple nodes bearing the spore masses.—*Lowe, Our Native Ferns*, ii., p. 384.

L. S. contracta—con-trac′-ta (contracted), *Lowe.*

A distinct and quite constant variety, originally found in the Valley of Conway, North Wales. Its barren fronds, about 5in. long, have the leaflets at their lower half remarkably narrow (Fig. 101), contracted and cleft; those above are larger, irregular, and somewhat ligulate (strap-shaped).—*Lowe, New and Rare Ferns*, t. 20c. *Nicholson, Dictionary of Gardening*, ii., p. 295.

Fig. 101. Barren Frond of Lomaria Spicant contracta (nat. size).

L. S. c. ramosa—ra-mo′-sa (branching), *Lowe.*

A very handsome, crested form of the previous variety, originally found in the Clova Mountains, in Scotland. Its fronds, similar in size and formation to those of the variety *contracta*, become branched at about 2in. from their summit, where they are also furnished with larger and irregular-shaped leaflets.—*Lowe, New and Rare Ferns*, t. 20d.

L. S. crispa—cris′-pa (curled), *Lowe.*

In this beautiful variety, found in Broadwater Forest, Tunbridge Wells, the barren fronds, 8in. to 10in. long, have their lateral segments crowded, blunt at the extremity, and curled on the margin. Their summit is crisped and multifid (much-cleft), forming a small tassel. The fertile fronds are similar in size and form, their leaflets being also blunt at the extremity.—*Lowe, Our Native Ferns*, ii., p. 382. *Nicholson, Dictionary of Gardening*, ii., p. 295.

L. S. cristata—cris-ta′-ta (crested), *Lowe.*

A very pretty variety, found in the neighbourhood of Tunbridge Wells, also on the Clova Mountains, and in a ravine of Saddleback, Keswick. Its barren fronds are 6in. to 8in. long, of normal shape, except at the extremity,

where they are usually divided and dilated. The fertile fronds are 1ft. long and have their leaflets mostly forked. Sometimes the barren fronds terminate in a large, multifid (much-cleft) head, and the plant often produces sharply-toothed, mock-fertile fronds, which are quite sterile. — *Lowe*, *Our Native Ferns*, ii., p. 391, fig. 802. *Nicholson*, *Dictionary of Gardening*, ii., p. 295.

L. S. flabellata—fla-bel-la′-ta (fan-shaped), *Lowe.*

This is such an extraordinary form that we cannot do better than reproduce in full its description from Lowe's work: "It is the most remarkable Lomaria yet found. It is scarcely to the species what *acrocladon* is to *Athyrium*, but is equally as remarkable as that fine form, and, what is singular, was found in the same vicinity (near Helmsley, Yorkshire) by the same discoverer, Mr. Monkman, of Malton, who first named this fine plant *ramo-cristatum*, but in consequence of the more markedly fan-like forms assumed by the strongly-developed fronds and the constantly-increasing tendency to dichotomous (repeated) forking, he was induced to adopt the name *flabellatum*, as being the most descriptive. The plant is robust, but has not proved fertile. The fronds branch into two, three, or four at the stipes (stalks), each division again repeatedly forking, and the same process repeating until the flabellate (fan-like) form is made up of a dense mass of foliage. The large, flat fronds hanging over the pot are very striking."— *Lowe*, *Our Native Ferns*, p. 402, fig. 822. *Nicholson*, *Dictionary of Gardening*, ii., p. 295.

L. S. heterophylla—het-er-oph-yl′-la (different-leaved), *Lowe.*

A curious variety, of small dimensions, found near Tunbridge Wells; on Ben Lawers, in Scotland; and also at Ilfracombe. Its barren fronds, barely 4in. long, are exceedingly varied, some being normal, others depauperated (impoverished) throughout, while others show some leaflets projecting beyond the margin and intermixed with shortened and normal leaflets.— *Lowe*, *New and Rare Ferns*, p. 47, t. 20A; *Our Native Ferns*, ii., p. 393.

L. S. imbricata—im-bric-a′-ta (imbricated, overlapping), *Lowe.*

In this variety the barren fronds, 6in. long, 2in. broad, are spear-shaped and taper upwards. The leaflets, very narrow at the base, are

crowded and overlap each other; they become largest in the centre of the frond. It is a handsome and distinct plant, of a more or less erect habit, forming a dense mass with a hollow centre, and it has a particularly wide range of habitat, having been found wild at Parracombe and Culborne, Devonshire; at Walsden, near Todmorden; at Lichfield; near Castle Malgwyn, Pembrokeshire, and in other localities.—*Lowe, Our Native Ferns*, ii., p. 393, t. 60B. *Nicholson, Dictionary of Gardening*, ii., p. 295.

Several forms of this variety are in commerce, the most distinct being *erecta* of Lowe, in which the barren fronds, symmetrically arranged and of an upright habit, are about 8in. long, almost strap-shaped, with their leaflets so markedly imbricated (overlapping) as to make the fronds appear almost double. It is remarkable that in most of these imbricated forms the fertile fronds are very little longer than the barren ones, and also that in the sub-variety *erecta* the leaflets of the fertile fronds are turned back so that their edges meet.

L. S. lancifolia—lan-cif-ol′-ĭ-a (lance-leaved), *Lowe.*

A singular variety, found near Tunbridge Wells, also on the Clova Mountains, and near Llanrwst and Todmorden. Its barren fronds are narrow and depauperated (impoverished) at the base, entire (undivided), and strap-shaped from their summit downwards nearly half their length. The fertile fronds, longer than the barren ones, have their upper portion spike-like and their lower half only pinnatifid, the sori (spore masses) being disposed in a continuous line close to the rachis (stalk of the leafy portion).—*Lowe, Our Native Ferns*, ii., p. 390, fig. 801. *Nicholson, Dictionary of Gardening*, ii., p. 295.

L. S. multifurcata—mul-tif-ur-ca′-ta (much-forked), *Lowe.*

A very distinct variety, found near Penryn, Cornwall, and also near Over-Darwen, Lancashire, with barren fronds 5in. to 10in. long, 2in. broad, nearly prostrate, each with a three to six or more times forked, flat, many-pointed termination 3in. to 4in. across, the forkings often inclining and curving to one side. The leaflets, frequently of unequal length, are slightly once-forked. The fertile fronds show the same forked character but are of erect habit.—*Lowe, Our Native Ferns*, ii., p. 392, fig. 803. *Nicholson, Dictionary of Gardening*, ii., p. 295.

L. S. polydactyla—pol-yd-ac′-tyl-a (many-fingered), *Moore.*

A beautiful variety, originally found in Cornwall, and one which, although not exactly crested, is exceedingly ornamental; for its barren fronds, of the same size as those of the typical plant, bear at the summit a beautiful group of five or six leaflets of a peculiarly flat nature (Fig. 102), a character which is also noticeable in the fertile fronds.—*Nicholson, Dictionary of Gardening*, ii., p. 295.

Fig. 102. Barren Frond of Lomaria Spicant polydactyla (¼ nat. size).

L. S. ramo-cristata—ra′-mo-cris-ta′-ta (branched and crested), *Lowe.*

A very pretty and distinct variety, of small dimensions, with twin or several times branched barren fronds about 5in. long, divided and crested at the summit of each branch (Fig. 103). The short and comparatively broad leaflets are almost square at their extremities. This form was originally discovered in Yorkshire by Mr. C. Monkman.—*Lowe, Our Native Ferns*, ii., p. 390, fig. 800.

L. S. ramosa—ra-mo′-sa (branched), *Lowe.*

This variety, found in a wild state near Wicklow, in Ireland, and at Windermere, is perhaps the handsomest form of *L. Spicant* with which we are acquainted. Its barren fronds, about 6in. long, have their rachis (stalk of the leafy portion) divided into two or three branches, and the extremities of the divisions much cleft and crisped, forming tufts or tassels fully 3in. across, the lower parts of the branches being normal, and the leaflets contracted towards the base. The fertile fronds, of a more erect habit, are produced more abundantly than is usually the case, and disposed in the centre of the plant; they are equally furnished with a terminal crest, which, however, is of smaller dimensions than the barren fronds.—*Lowe, New and Rare Ferns*, iv., t. 21A; *Our Native Ferns*, ii., p. 385.

Fig. 103. Barren Frond of Lomaria Spicant ramo-cristata (⅓ nat. size).

L. S. serrata—ser-ra′-ta (toothed like a saw), *Lowe.*

A strong-growing and beautiful variety, found near Tunbridge Wells, at Barnstaple, at Todmorden, &c. Its barren fronds (Fig. 104), 1ft. long and 3in. broad in the centre, are furnished with somewhat sickle-shaped, deeply yet finely toothed leaflets, the tips of which are often forked. The fertile fronds are longer and of more upright habit; their leaflets are very narrow, sharply toothed, and occasionally forked at the summit.—*Lowe, Our Native Ferns*, ii., p. 389, fig. 798.

Fig. 104. Barren Frond of Lomaria Spicant serrata

(½ nat. size).

L. S. serrulata — ser-rul-a′-ta (having small teeth), *Lowe.*

A pretty, dwarf form, having very narrow, spear-shaped barren fronds, furnished with short leaflets closely set and beautifully serrulated on the margin. These fronds are of a peculiar shape, gradually widening towards their summit, which terminates in a short tail-like process.—*Lowe, Our Native Ferns*, ii., p. 394, fig. 823. *Nicholson, Dictionary of Gardening*, ii., p. 295.

L. S. stricta—stric′-ta (upright), *Lowe.*

A distinct variety, found in Westmoreland, also in Ireland and near Llanrwst. Its barren fronds, 1ft. long and spear-shaped, are 1in. broad at their widest part, and are furnished with toothed leaflets often depauperated (impoverished) at the base. The fertile fronds, 1ft. to 1½ft. long, are furnished with very narrow and much shorter leaflets, so that they look much narrower than the barren ones.—*Lowe, Our Native Ferns*, ii., p. 381, fig. 786. *Nicholson, Dictionary of Gardening*, ii., p. 295.

L. S. subserrata—sub-ser-ra′-ta (somewhat toothed), *Lowe.*

A very handsome variety, found near Castle Howard, in Yorkshire, and also near Todmorden. Its barren fronds, 6in. to 12in. long and 1in. broad, are furnished with somewhat sickle-shaped leaflets naturally curving upwards, having more or less deep, broad, and round-toothed on the lower edge.

The fertile fronds are very similar in shape and size, but are furnished with much narrower leaflets.—*Lowe*, *Our Native Ferns*, ii., p. 385, t. 59A.

Fig. 105. Barren Frond of Lomaria Spicant trinervis (½ nat. size).

L. S. trinervis—trin-er′-vis (three-nerved), *Lowe*.

This remarkably handsome variety, originally found on the Sugar-loaf Mountains, in Wicklow, differs from all other known forms through the division of the barren fronds (Fig. 105) into three sections near the base, where one lateral branch is produced on either side of the central one, which is usually much larger than the lateral ones. The fertile fronds, which are but sparingly produced—seldom more than two on a plant—are branched at the base in the same way. Sometimes the summit of the fronds, and the extremity of the branches, are forked or even terminated by a crest of very distinct character; it is then called *L. S. t. coronans* (Fig. 106).—*Lowe*, *Our Native Ferns*, ii., p. 400. *Nicholson*, *Dictionary of Gardening*, ii., p. 295.

L. S. variabilis—var-ĭ-a′-bil-is (variable), *Moore*.

A variety of small dimensions, with barren fronds 4in. to 5in. long, enlarging upwards for about one-third of their length, and then suddenly contracting; they frequently branch towards or at the point, and diminish near the stalk, with here and there a projecting leaflet.—*Nicholson*, *Dictionary of Gardening*, ii., p. 295.

Fig. 106. Lomaria Spicant trinervis coronans (½ nat. size).

L. tenuifolia—ten-ŭ-if-ol′-ĭ-a (slender-fronded). Synonymous with *Acrostichum tenuifolium*.

L. tuberculata—tu-ber-cul-a′-ta (warted). A synonym of *L. procera ornifolia*.

L. vestita—ves-ti′-ta (clothed). A variety of *L. procera*.

Nephrodium lepidum

(½ nat. size).

L. Vieillardii—Vieil-lard′-ĭ-i (Vieillard's), *Baker.*

A stove species, of medium dimensions, native of New Caledonia. Its barren fronds, 1ft. or more in length and 1in. to 3in. in breadth, vary in shape from narrow and entire (undivided) to oblong, with a long, narrow, entire point, and several leaflets 1½in. to 2in. long and ½in. broad. The fertile fronds are usually pinnate (divided to the midrib), with several narrow, distinct leaflets disposed ½in. to ¾in. apart at the base.—*Hooker*, *Synopsis Filicum*, p. 175.

L. vulcanica—vul-ca′-nic-a (volcanic), *Blume.*

This totally distinct, greenhouse species, native of New Zealand, Tasmania, Java, and the Polynesian Islands, is suitable alike for the rock Fernery or for a Fern-case. Its broadly egg-shaped barren fronds, 6in. to 18in. long and 3in. to 6in. broad, are produced from a thick, oblique, short stem or trunk of a woody nature and densely clothed at the crown with blackish scales, and are borne on pale, erect stalks 4in. to 6in. long. The leaflets, of a leathery texture, and with parchment-like, undulated margins, are spear-shaped, slightly enlarged at the base, and bluntish at the point; the lowest pair are usually deflexed (thrown back). The fertile fronds are of the same size as the others, but their contracted leaflets are very narrow, distantly placed, and suddenly enlarged at the base.—*Hooker*, *Species Filicum*, iii., p. 13. *Nicholson*, *Dictionary of Gardening*, ii., p. 295.

L. zamiæfolia—za-mĭ-æ-fol′-ĭ-a (Zamia-leaved). A synonym of *L. Boryana cycadoides.*

L. zamioides—za-mĭ-ŏ-i′-dēs (Zamia-like). A popular garden name for *L. Boryana* and its variety *cycadoides.*

CHAPTER XXXIV.

LONCHITIS, *Linnæus.*

(Lonch-i′-tis.)

IN Hooker and Baker's "Synopsis Filicum" *Lonchitis* forms Genus 23. Mettenius unites it with *Pteris*, from which it differs only by the position of the sori (spore masses). The name is derived from *lonche*, a lance, in allusion to the shape of the fronds. The distinguishing characters reside in the disposition of the sori, which are marginal and placed in the sinuses (depressions) of the fronds, and in the shape of these organs, which usually are more or less reniform (kidney-shaped), but sometimes considerably elongated. The involucres, of the same shape as the sori, which they cover, are of a parchment-like texture, and are formed of the reflexed margin of the fronds on which the spores are produced. So far as we know, the geographical distribution of the genus *Lonchitis* is limited to Africa and the adjacent islands, Mauritius, Bourbon, Madagascar, &c., though it is reported by Linden that he collected *L. Lindeniana* (*L. pubescens*) in Caracas, South America.

Only a couple of species of this genus are known at present: both of these are bold-growing plants, provided with underground rhizomes (prostrate stems) of a fleshy nature. Their crowns, which sometimes grow a few inches above the surface of the soil, are also very succulent, and produce robust fronds, borne on light-coloured stalks, which, when young, are of a semi-transparent nature.

Culture.

Lonchitises thrive in a mixture of two parts peat and one part fibrous loam; they require an abundance of water at the roots and complete protection from the direct rays of the sun. These plants may possibly be objected to for pot culture on account of their strong growth; but in the conservatory or in the rock Fernery, where bold-looking plants are frequently required for effect, they never fail to prove a source of attraction, especially when planted out with sufficient space allowed them in which to develop their handsome fronds. When fertile, the fronds are very conspicuous on account of the bright colour of the spore masses. Though usually propagated by division of their underground rhizomes, these plants may also be increased be means of their spores, which germinate freely if sown as soon as they are ripe.

Species.

L. Lindeniana—Lin-den-ĭ-a′-na (Linden's). The plant so called is identical with *L. pubescens*, as are also *L. madagascariensis* and *L. natalensis.*

L. occidentalis—oc-cid-en-ta′-lis (Western), *Baker.*

This greenhouse species, native of Fernando Po, Angola, and the Cameroon Mountains, where it grows at 4000ft. elevation, produces triangular fronds 2ft. to 4ft. long and tripinnatifid (three times cut down nearly to the midrib), except very near their summit; they are borne on strong, upright, naked stalks 1ft. to 2ft. long. The lower leaflets are narrowly triangular, 1ft. to 1½ft. long, and 9in. broad; they are again divided into spear-shaped leafits, cut down below about three-quarters of the way to the midrib into blunt lobes of a somewhat oblong form. The distinctly kidney-shaped sori (spore masses) are placed in the sinuses (depressions) at the base, or along the margin of the ultimate lobes. This species is readily distinguished from the more popular *L. pubescens* through the naked nature of the surfaces and rachis (stalk of the leafy portion).—*Hooker*, *Synopsis Filicum*, p. 128.

L. pubescens—pu-bes′-cens (downy), *Willdenow.*

This, by far the more popular species, also known as *L. Lindeniana*, *L. madagascariensis*, *L. natalensis*, &c., is a strong-growing kind and one

which has a very wide range of habitat; for, besides being found in the same places as the above-named species, it is also a native of the Mauritius, Bourbon, Johanna, and Seychelles Islands, as well as of Natal and Cape Colony, and requires stove temperature. Its ample fronds, similar in shape and cutting to those of the species just described, are 2ft. to 4ft. long, and borne on strong, upright stalks 1ft. to 2ft. long, densely clothed with woolly or downy pubescence. The lower leaflets, sometimes 1ft. to

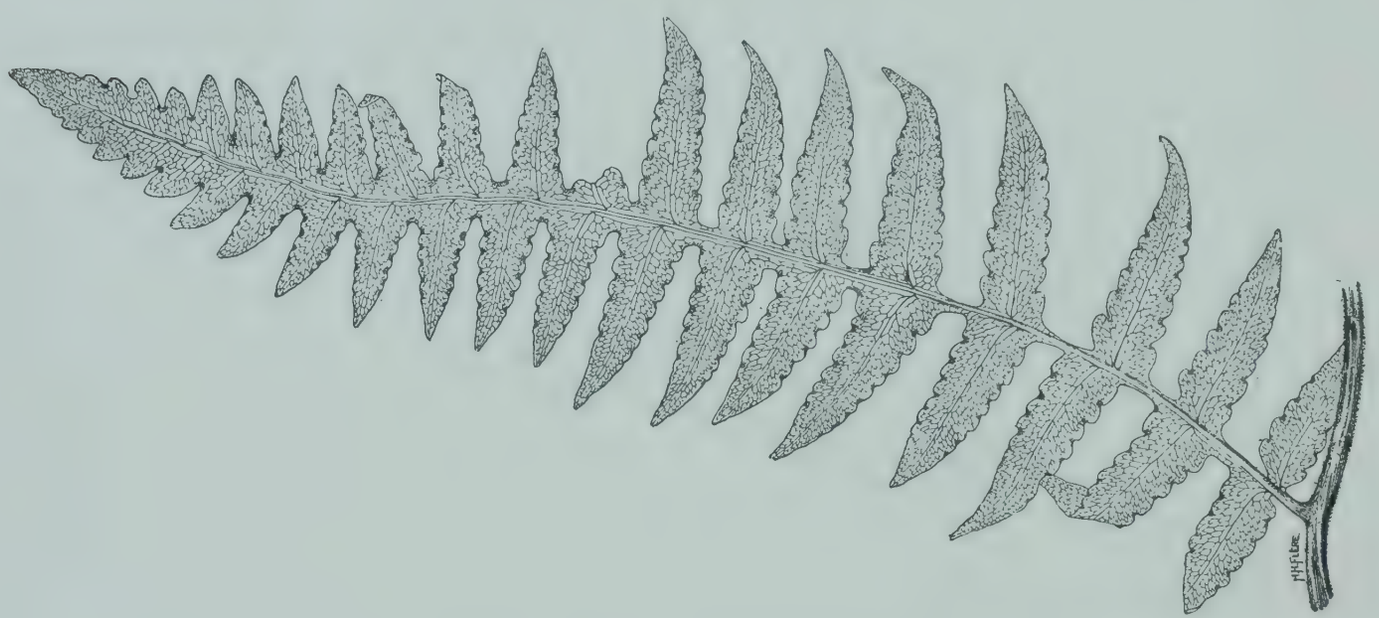


Fig. 107. Pinna of Lonchitis pubescens
(⅛ nat. size).

1½ft. long and 4in. to 5in. broad, are furnished with spear-shaped leafits of a light green colour and very soft texture, cut down nearly or quite to the midrib below into blunt, oblong, waved segments (Fig. 107). In this handsome species the rachis (stalk of the leafy portion) and under-surface, especially the midrib, are conspicuously downy, and the sori (spore masses) are placed round the main sinuses (depressions) of the leafits and in two or three of the segments on each side.—*Hooker*, *Species Filicum*, ii., p. 56.

LORINSERIA—Lor-in-se′-rĭ-a. *See* **Woodwardia.**

LOXOSCAPHE—Lox-os′-caph-e. *See* **Davallia.**

CHAPTER XXXV.

LOXSOMA, *Brown.*

(Lox-so′-ma.)

NEW ZEALAND furnishes the only species of this genus, which, with *Hymenophyllum* and *Trichomanes*, goes to make up the tribe *Hymenophylleæ*. Through its habit, as well as through the peculiar texture of its foliage, the plant bears no resemblance whatever to the other *Hymenophylleæ*. In Hooker and Baker's "Synopsis Filicum" *Loxsoma* forms Genus 15. It derives its name from *loxos*, oblique, and *soma*, a body, on account of its sporangia (spore-cases) being girt by an incomplete ring. As in some of the other *Hymenophylleæ*, the sori (spore masses) of *Loxsoma* are marginal, produced at the extremity of a vein, and disposed in the sinuses (depressions) of the teeth or lobes of the fertile portions of the fronds, and their receptacle, which is elongated and much exserted (thrust out), like those of *Trichomanes* and certain species of *Hymenophyllum*, are clothed to their extremity with stipitate (stalked) capsules (mixed with jointed hairs), which have a short, broad, incomplete, oblique ring opening vertically.

Culture.

Very little can be said with certainty on the culture of this remarkable Fern, for, although we have frequently had the opportunity of unpacking dead specimens, it has never been our good fortune to see it under

cultivation, either in this or in any other country. We can, therefore, rely only on the particulars furnished by careful observers in its native habitat, where it is said to be found growing with the foliage exposed to the action of the air to such a degree that no other member of the tribe *Hymenophylleæ* could withstand; but at the same time with its roots, which are of a peculiarly wiry nature, constantly in water. The soil in which it is found in its native places is said to be a yellow loam of a very clayey nature, and this has proved to be the case with all the importations which we have seen. Nothing can be said either about its propagation, except that in a natural state it increases itself rapidly by means of its spores, which are produced in great abundance.

L. Cunninghami—Cun-ning-ham′-i (Cunningham's), *Brown.*

This remarkable, greenhouse Fern, native of the Northern Island of New Zealand, produces its handsome fronds from a long, stout, creeping stem. They are several times divided to the midrib, of a leathery texture, pale green above, glaucous (bluish-green) beneath, 1ft. to 1½ft. long, and are borne on stiff, erect stalks of the same length. The general habit of the plant is that of a leathery-leaved Dicksonia.—*Hooker*, *Species Filicum*, i., p. 86. *Nicholson*, *Dictionary of Gardening*, ii., p. 299.

LYGODICTYON—Lyg-od-ic′-tў-on. *See* **Lygodium.**

CHAPTER XXXVI.

LYGODIUM, *Swartz.*

(Lyg-o′-dĭ-um.)

Climbing Ferns.

THIS comparatively small yet widely-diffused genus, which has no British representative, is composed of wide-climbing or twining Ferns, most of which require stove temperature. The name *Lygodium* is derived from *lygodes*, flexible, in reference to the flexible habit of all the members comprised in this group of the sub-order *Schizæaceæ*, which in Hooker and Baker's "Synopsis Filicum" forms Genus 68. Besides their climbing or twining habit, these plants have as a distinguishing character the formation of their fructification: this consists of capsules, solitary or casually in pairs, disposed in the axils (forkings) of large, imbricated (overlapping), clasping involucres (coverings of the spore masses), which form spikes either in separate leaflets or in lax rows along the edge of the leafy ones. As has been explained at pp. 57 to 59 of Vol. I., the fronds of all Lygodiums are totally different from those of any other Ferns; consisting as they do of a stalk or shoot possessing the power of almost indefinite elongation, and sometimes attaining under cultivation 20ft. to 30ft. in length. They are also of a different structure: though of various forms, their leaflets are never directly disposed on the stalk or shoot, but are connected with it through "primary" and "secondary" petioles. The primary petioles are the short, sometimes very short, stalks which bring the climbing or twining stem into contact

with the secondary petioles, the latter being a connecting link between the primary petioles and the leafy portions.

All known Lygodiums were formerly divided into three sections: one in which the fully-developed barren leaflets are either palmate (shaped like the hand), as in *L. palmatum*, or dichotomously (repeatedly) forked, as in *L. dichotomum;* another in which the fully-developed barren leaflets are distinctly pinnate (once divided to the midrib), as in *L. volubile*; while in the third one the veins, instead of being free, are anastomosing (intercrossing each other), which character is well shown in *L. reticulatum*. According to these special characters, the plants forming the genus *Lygodium* have been called *Hydroglossum* by Presl, and *Lygodictyon* by J. Smith, but these names, although still retained in some private collections, have now been completely abandoned for scientific purposes.

Culture.

To the particulars bearing on the habit and the mode of growth of Lygodiums, as well as on the various uses to which they are specially adapted, already published at pp. 57-59 of Vol. I., we may here add that they all luxuriate in rich, spongy soil of an open nature; that which suits them best being a mixture of peat or good leaf mould, loam, and chopped sphagnum, in about equal proportions. It must also be borne in mind that they require an abundance of water at the roots, and are greatly benefited by frequent and copious syringings during their most active season, from May to October. It is only when planted out that these singular Ferns show themselves to advantage and attain their full development, and in that condition they are also less liable to the attacks of garden pests than when they have their roots bound in pots. Except when otherwise indicated, all the species here described require stove treatment.

Propagation is effected by means of spores, when the plants are required in quantities, and such is the method usually adopted for producing strong, healthy plants of *L. japonicum* (*L. scandens* of commerce), which species is the most generally grown. Most of the other species are increased by the division of the crowns, which operation may be safely done at any time between March and September.

Principal Species and Varieties.

L. articulatum—ar-tic-ul-a′-tum (articulated, jointed), *A. Richard.*

This is a very well-marked, greenhouse species, native of New Zealand, with primary petiole (first stalk) ¼in. to ½in. long, the secondary petioles being 1in. or more long, and with barren and fertile leaflets totally distinct. The former, of a somewhat leathery texture and naked on both surfaces, are twice forked, and are composed of four ligulate-oblong (broadly strap-shaped) segments 2in. to 3in. long, about ½in. broad, blunt at the point, and very distinctly articulated at the base of a short stalk. The fertile leaflets are many times forked, and have their fructification in dense clusters, forming short spikes of spore masses.—*Hooker*, *Synopsis Filicum*, p. 437.

L. Boivini—Boi-vi′-ni (Boivin's), *Mettenius.*

A native of the Island of Nossibe, near Madagascar, readily distinguished by the winged and continuous nature of the petioles (stalks) of its barren leaflets, which are of a parchment-like texture, smooth on both surfaces, 6in. to 7in. long, 1in. broad, and have three or four strap-shaped, generally blunt segments on each side. The fertile leaflets are shorter, about ½in. broad, and are furnished with narrow, more or less closely-set lobes.—*Hooker*, *Synopsis Filicum*, p. 525.

L. circinatum—cir-cin-a′-tum (circinate, rolled inwards). Synonymous with *L. dichotomum.*

L. dichotomum — dich-ot′-om-um (dichotomous, repeatedly forked), *Swartz.*

This very beautiful species, which is also known as *L. circinatum*, *L. flexuosum*, and *L. pedatum*, is a native of Chusan, Hong-Kong, Ceylon, and the Philippine and Malayan Islands. It deserves to be extensively grown, for it is perhaps the finest of the whole genus. The very long shoots are well furnished with repeatedly-divided fronds, which are disposed in pairs, opposite and somewhat distant. The primary petiole (first stalk) is so much reduced that the fork seems almost to spring from the main rachis or shoot; the secondary ones, 1in. to 2in. long, are firm and naked. The

finger-shaped leaflets are composed of five or six lobes, reaching nearly down to the base, or once or even twice forked. The barren divisions, 8in. to 12in. long and ½in. to ¾in. broad, are of a beautiful bright green colour and of a leathery texture, with both surfaces naked. The fertile divisions, very much narrower and contracted, have their spore masses disposed in spikes one to two lines long, in close, marginal rows.—*Hooker and Greville*, *Icones Filicum*, t. 55. *Beddome*, *Ferns of Southern India*, t. 62. *Nicholson*, *Dictionary of Gardening*, ii., p. 308. *Lowe*, *Ferns British and Exotic*, viii., t. 73.

L. dichotomum is a species well adapted for covering large pillars, as it is of very robust growth and most effective; its foliage, though somewhat massive, is very elegant, and remains on the plant for a very long time. It is not unusual to find specimens of this species trained on pillars and against the glass, as in the large Tropical Fernery at Kew Gardens, where they command the admiration of all visitors, retaining their foliage for three or even four years.

L. digitatum—dig-it-a′-tum (digitate, hand-like), *Eaton*.

A native of Panama, New Granada, and Guatemala, having very long shoots furnished with hand-shaped fronds. The primary petiole is very short or obsolete, and the secondary ones are 1in. or more long. The leaflets are cut down nearly to the base, and once forked into lobes 6in. to 12in. long and ¾in. to 1in. broad; they have their point somewhat blunt, are narrowed at the base, and the edges of the barren ones, which are of a leathery texture, are finely toothed. In the fertile divisions the spikes are disposed in close rows along the edge on both sides.—*Hooker*, *Synopsis Filicum*, p. 437.

L. flexuosum—flex-ŭ-o′-sum (flexuose, winding). This is a synonym of *L. dichotomum*.

L. Forsteri—Fors′-ter-i (Forster's). Synonymous with *L. reticulatum*.

L. hastatum—has-ta′-tum (hastate, halbert-shaped). Synonymous with *L. volubile*.

L. heterodoxum—het-er-od-ox′-um (heterodox), *Kunze.*

This species, native of Mexico and Guatemala, is also known in gardens as *L. spectabilis*, *Hydroglossum Lindeni*, and *Lygodictyon Lindeni*. The primary petiole (first stalk) is very short or obsolete; the secondary ones are about 1½in. long. The leaflets have their ultimate divisions 4in. to 6in. long, ¾in. broad, of a thin texture, naked on both surfaces, and borne on petioles that are not articulated, the lowest often ½in. long. The fertile divisions show the fructification disposed in close rows along their edge.—*Hooker*, *Synopsis Filicum*, p. 439.

L. japonicum—jap-on′-ic-um (Japanese), *Swartz.*

This very pretty and elegant, greenhouse species is a native of Japan and China; it also extends from the Himalayas to Ceylon, Java, the Philippines, and North Australia. It is easily distinguished from all other species by the shape of its leaflets (see Plate), which are 4in. to 8in. long, nearly as broad, and triangular; the primary petiole (first stalk) is very short, and the secondary one is from ½in. to 1in. long. The terminal segments are halbert-shaped, whereas the lateral ones, two or three on each side, are very unequal, and not articulated at the base; the lower ones, borne on longer stalks, are pinnate (divided to the midrib) in their lower part, their divisions being entire or notched; they are of a soft, papery texture and a most pleasing pale green colour. The fertile divisions, of the same shape as the barren ones, are much contracted, and bear their fruiting spikelets on the edge on both sides.—*Hooker*, *Synopsis Filicum*, p. 439. *Nicholson*, *Dictionary of Gardening*, ii., p. 308. *Lowe*, *Ferns British and Exotic*, viii., t. 72. *Beddome*, *Ferns of Southern India*, t. 64.

L. japonicum is undoubtedly the most popular member of the whole genus; its decorative merits are so well recognised that for years past thousands of plants of it have found their way to our great flower markets, where it is known only under the name of *L. scandens*. The consequences of this mis-naming are that in many, if not all, private establishments the plant is found under the spurious name, and that the true *L. scandens*, which is a totally different plant, exists only in botanical gardens and in a few nurseries, where visitors generally bestow a doubtful and criticising look on the name of *L. japonicum* appended to the true specimens. *L. japonicum* is a delightful

climber, producing shoots 8ft. to 10ft. long, of an exceedingly tender nature, and furnished with finely-cut foliage of a cheerful green colour, forming light festoons that are very useful for table-decoration. It is well adapted for growing in a Fern-case in the drawing-room, but in any case it should be placed near the light. The plant may also be grown in a basket, and in that way shows itself to the greatest advantage. A hanging basket of small dimensions is of little use, as it does not afford sufficient scope for the full development of the plant; but if a wire basket 12in. or 14in. in diameter is used, and three plants are at the outset put in it, one between each chain, it will, in a remarkably short space of time, make a specimen that has no equal for elegance; for while some of the strongest shoots are trained upwards along the chains and in the centre of the basket, those of medium growth, by being allowed to hang all around the sides, will soon completely cover it.

L. lanceolatum—lan-cĕ-ol-a′-tum (spear-shaped ?), *Desvaux.*

This robust species, native of Madagascar, has the primary petiole (first stalk) short or obsolete, while the secondary ones are about 1in. long. The leaflets, 8in. to 12in. long and 6in. to 10in. broad, are divided into three or four uniform segments on each side; these are of a leathery texture, glossy on both surfaces, 4in. to 6in. long, ¾in. to 1in. broad, all stalked, and articulated (jointed) at the base, which is rounded or wedge-shaped, but never heart-shaped. In the fertile divisions the fructification is arranged in spikes one to two lines long, and disposed in close rows along the edge on both sides. This species is the *Hydroglossum madagascariensis* of Poiret.—*Hooker, Synopsis Filicum*, p. 439.

L. Lindeni—Lin′-den-i (Linden's). A garden name for *L. heterodoxum.*

L. madagascariensis—mad-ag-as′-car-ĭ-en′-sis (from Madagascar). A synonym for *L. lanceolatum.*

L. microphyllum — mi-croph-yl′-lum (small-leaved). A form of *L. scandens.*

L. palmatum—pal-ma′-tum (shaped like a hand), *Swartz.*

This charming, greenhouse species, of comparatively small dimensions, is undoubtedly the most delicate-looking as well as the hardiest kind

comprised in the genus. It is a native of North America, where it is found growing plentifully in low, moist thickets, and damp, open woods, from Massachusetts to Virginia, Eastern Tennessee, and even Florida. From a wide-creeping rhizome (rootstock) of a very slender nature and of a dark brown, almost black colour, the extremity of which is scantily furnished with short, semi-transparent, jointed hairs, rise at a distance of 1in. or 2in. apart a quantity of delicate climbing fronds which, for grace and elegance, are not equalled by those of any other species in cultivation. The stipes (stalks) on which they are borne are dark at the base, but of a pale green colour a few inches above the ground; although very slender, yet they possess considerable strength, as their texture is very tough. The lovely fronds, which, when mature, show a fertile portion totally different from the barren ones, creep and climb or twine over other plants to the height of 3ft. or 4ft. The totally barren fronds, as well as the lower portion of the fertile ones, are strictly bipinnate (twice divided to the midrib) and of a peculiar shape, inasmuch as, beginning at 6in. or 8in. from the ground, the twining midrib bears very short branchlets disposed 1in. or 2in. apart. These branchlets in their turn divide into two slender petioles (stalks) $\frac{1}{8}$in. to $\frac{1}{4}$in. long, each fork supporting at its end a kidney-shaped, deeply-lobed leaflet, $1\frac{1}{2}$in. to 2in. broad, with a deeply-rounded sinus (depression) at the base (Fig. 108). These leaflets, of a rather delicate texture, and of a fine pale pea-green colour above and glaucous beneath, are divided into from five to seven oblong, blunt lobes, cut more than half-way down and apparently smooth on both surfaces, although a few hairs have at times been noticed on the under-side. A very ornamental character is imparted to this most interesting plant by the handsome appearance of the fertile portion of its

Fig. 108. Lygodium palmatum ($\frac{1}{3}$ nat. size).

fronds. This is composed of several pairs of somewhat triangular leaflets, three or four times pinnatifid (cut nearly to the midrib), being pinnately divided, with leafits generally three-lobed, and formed only of winged rachises (stalks) and short, spike-like, fertile ultimate divisions of a very graceful and elegant appearance.—*Hooker*, *Filices Exoticæ*, t. 24. *Nicholson*, *Dictionary of Gardening*, ii., p. 309. *Lowe*, *Ferns British and Exotic*, viii., t. 74. *Eaton*, *Ferns of North America*, i., t. 1.

Particulars as to the protection of *L. palmatum* by law, and also as to the use in America of the foliage, are given in full on pp. 58 and 59 of Vol. I. To grow well and to freely produce its handsome fertile fronds, whose fructification, borne in miniature catkins, ripen about September, this species requires a very porous soil; the best mixture is good leaf mould and chopped sphagnum in equal parts, with an abundance of water at the roots all the year round, but principally from March to September.

L. pedatum — ped-a′-tum (bird's-foot-shaped). This is synonymous with *L. dichotomum.*

L. pinnatifidum—pin-na-tif′-id-um (pinnatifid, divided nearly to the midrib), *Swartz.*

A very handsome species, having a wide range of habitat, as it is a native of the Himalayas, Ceylon, the Philippine Islands, North Australia, Angola, Guinea, &c. In general appearance it somewhat resembles the better-known *L. venustum;* it is almost devoid of primary petiole (first stalk), its leaflets being closely set on to the stem. These leaflets, 8in. to 12in. long, 6in. to 12in. broad, and usually set in pairs, are composed of a ligulate-oblong (broadly strap-shaped) terminal segment 3in. to 6in. long and ½in. to ¾in. broad, and three or four lateral ones on each side, usually either rounded or heart-shaped, all articulated (jointed) at the base, the lower ones, or all, short-stalked and sometimes halbert-shaped or pinnate (divided to the midrib) below; all are of a somewhat leathery texture and of a very bright green colour, with both surfaces either naked or slightly downy. The fructification, which consists of little spikes one to three lines long, disposed in close rows along the edge of the leafy segments, is very pretty and effective.—*Hooker*, *Synopsis Filicum*, p. 438. *Beddome*, *Ferns of Southern India*, t. 63.

L. polymorphum—pol-ym-orph′-um (many-formed). Synonymous with *L. venustum.*

L. polystachyum—pol-ys-tach′-ŷ-um (many-spiked), *Wallich.*

A native of the Malayan Peninsula, and easily distinguished from all other species by its mode of fructification and by its numerous uniform leaflets being deeply and regularly pinnatifid (cut nearly to the midrib). The primary petiole (first stalk) is very short, the secondary ones being about ½in. long. The leaflets, 8in. to 12in. long and 4in. to 6in. broad, are divided into uniform segments 2in. to 3in. long, ¾in. broad, and jointed at the base; these are disposed nine to twelve on each side, and are cleft more than half-way down to the stalk into close, entire, blunt lobes; the upper segments are sessile (stalkless), the lower ones are short-stalked, and all are of a somewhat leathery texture and downy on both surfaces. The fructification occupies the back of the scarcely-modified barren lobes. This species differs in general aspect from all other known Lygodiums on account of its stems being of a beautiful claret colour at the base, and covered all over with short, woolly, whitish down, which is also observable on both surfaces of the leaflets.—*Hooker*, *Second Century of Ferns*, t. 76. *Nicholson*, *Dictionary of Gardening*, ii., p. 309.

Although requiring as much water at the roots as any other kind, *L. polystachyum* will not stand syringing over its foliage.

L. reticulatum—re-tic-ul-a′-tum (reticulated, netted), *Schkuhr.*

This fine, bold-looking plant, native of the Polynesian Islands and Eastern Tropical Australia, though not so hardy as the Japanese and North American species, has for a long time been considered a gem among the large climbing Ferns; it is particularly effective when grown around a pillar where massive foliage is required, for, besides being a robust grower, its beautiful fronds are of a rich, dark, glossy colour, especially when the plant is grown in a rather shady place. These fronds, which are of indefinite length and distinctly bipinnate (twice divided to the midrib), are furnished with numerous pairs of leaflets, all disposed exactly opposite, the primary petiole (first stalk) being only ¼in. long and the secondary ones ½in. long. The leaflets are composed of a terminal segment and from four to six lateral ones on each side; these are of a firm, almost leathery texture, either rounded

or heart-shaped at the base, 2in. to 3in. long, ½in. to ¾in. broad, all articulated at the base, and the lower ones short-stalked ; they are also rendered very attractive by their margins being finely toothed and beautifully wavy. The fertile segments, which are broader, though shorter, than the barren ones, bear the small, oblong fruit-spikes, one to three lines long, in close rows on

Fig. 109. Pinna and Fertile Pinnule of Lygodium reticulatum
(Pinna, nat. size; Fertile Pinnule, ½ nat. size).

the margins, where they appear like so many blunt teeth (Fig. 109). This species is the *L. Schkuhri* of J. Smith and the *Lygodictyon Forsteri* of J. Smith.—*Hooker*, *Synopsis Filicum*, p. 439. *Nicholson*, *Dictionary of Gardening*, ii., p. 309. *Lowe*, *New and Rare Ferns*, t. 35.

A soil of a little more substantial nature than that recommended for other kinds suits *L. reticulatum* best.

Gymnogramme elegantissima

(⅓ nat. size).

L. scandens—scan′-dens (climbing), *Swartz.*

This is a species of very slender growth and somewhat bushy habit, thoroughly distinct from the *L. scandens* of commerce, which is synonymous with *L. japonicum.* Swartz's *L. scandens* is a native of South China, the Himalayas, Queensland, the Malayan Islands, Ceylon, and the Guinea Coast. The primary petiole (first stalk) is very short, and the secondary ones are about ½in. long. The leaflets, 4in. to 8in. long and 2in. to 4in. broad, are composed of a terminal segment and four or five on each side, which are very variable in shape. The segments are usually simple (undivided), broadly strap-shaped, with a rounded or heart-shaped base, sometimes halbert-shaped or even slightly pinnate (cleft to the midrib) below, always articulated (jointed) to a short petiole, and spread at right angles from the rachis (stalk of the leafy portion); they are of a firm texture and glaucous (bluish-green) colour, naked, or nearly so, on both surfaces. The fructification consists in the spikes, one to three lines long, being disposed in close rows along the edge of the segments. A character peculiar to this species is the natural propensity which it possesses for developing fresh young shoots all along the stems, being in that respect much more prolific than any other species in cultivation. The variety *microphyllum* of Brown is a common form, with short, broad segments.—*Hooker*, *Synopsis Filicum*, p. 437. *Nicholson*, *Dictionary of Gardening*, ii., p. 309. *Beddome*, *Ferns of Southern India*, t. 61.

L. Schkuhri—Schkuhr′-i (Schkuhr's). A synonym of *L. reticulatum.*

L. semihastatum—se-mĭ-has-ta′-tum (half halbert-shaped), *Desvaux.*

A native of the Mariana Islands, with primary petiole (first stalk) nearly or quite obsolete, and secondary ones 1in. or more long. The leaflets are once forked and short-stalked; the divisions, simple and strap-shaped, are 6in. to 8in. long, nearly 1in. broad, unequal at the base, on one side of which they are distinctly heart-shaped. The texture is leathery, and in the fertile segments the spikes, about ¼in. long, are disposed in close rows along their edge.—*Hooker*, *Synopsis Filicum*, p. 437.

L. spectabilis—spec-ta′-bil-is (showy). Synonymous with *L. heterodoxum.*

L. subalatum—sub-al-a′-tum (nearly winged), *Bojer.*

A very distinct species, native of Madagascar and the Comoro Islands. Its long fronds are furnished with leaflets 6in. to 9in. long, 4in. to 6in. broad, somewhat triangular, bipinnate (twice divided to the midrib), and divided into very closely-set, often overlapping segments, six of which are usually found on each side below the terminal leaflet. This plant is midway between *L. japonicum* and *L. polystachyum*, and has the pinnatifid barren segments of the latter.—*Hooker*, *Synopsis Filicum*, p. 438.

L. venustum—ven-us′-tum (pleasing), *Swartz.*

A native of the West Indies, Mexico, Brazil, and Peru, somewhat resembling *L. scandens*, but of larger dimensions and of a constantly downy nature. The fronds are of indefinite length, and the primary petiole (first stalk) is so short that the leaflets appear as sessile (stalkless). The leaflets are 6in. to 12in. long, 4in. to 6in. broad, and composed of a terminal leafit and from four to twelve on each side, all of which are simple (undivided), broadly strap-shaped, jointed at the base, and bluntly lobed at the edge when barren. The fructification is formed of spikelets one to four lines long, disposed in close rows, which give the fertile portion of the frond the appearance of being pinnatifid. Both surfaces of the leaflets, as well as the stalks, are densely clothed with greyish hairs, which may be considered a very uncommon and peculiar character. *L. polymorphum* of Humboldt, Bonpland, and Kunth, is identical with *L. venustum.*—*Hooker*, *Synopsis Filicum*, p. 438. *Nicholson*, *Dictionary of Gardening*, ii., p. 309.

This plant requires a good deal of space for its development, as it is a robust and rapid grower, and one of the few Lygodiums averse to being syringed overhead during the summer months.

L. volubile—vol-u′-bil-ĕ (twining), *Swartz.*

In this somewhat close-growing species, native of Cuba and Brazil, the primary petiole (first stalk) is nearly or quite obsolete; the secondary ones, about 1in. long, bear leaflets 8in. to 12in. long, 6in. to 10in. broad, formed of a simple terminal leafit, broadly oblong in shape, 3in. to 6in. long, and 1in. to 1¼in. broad, and three to five pairs of lateral ones, somewhat wedge-shaped and jointed at the base, all distinctly though shortly stalked, and of

a bright green colour. The texture is somewhat leathery, and both surfaces are either naked or slightly downy. The fertile portions of the fronds show spikes 1in. to 3in. long, closely disposed in rows along the edge of the leafy segments. *L. volubile* is also known as *L. hastatum.—Hooker, Synopsis Filicum*, p. 438. *Nicholson, Dictionary of Gardening*, ii., p. 309.

CHAPTER XXXVII.

MARATTIA, *Swartz.*

(Mar-at′-tĭ-a.)

THE memory of J. F. Maratti, an Italian botanist who, in 1760, published a book entitled "De Floribus Filicum," is perpetuated in this well-marked genus, which embraces eight species of evergreen plants, and extends all round the world within the tropics, reaching a little beyond the southern one. In Hooker and Baker's "Synopsis Filicum" *Marattia* forms Genus 70; it is the most distinct portion of the sub-order *Marattiaceæ*, of which, in an elaborate illustrated Monograph published by De Vriese and Harting, at Leyden, in 1853, no less than ninety-four species are defined.

Marattias are distinctly characterised by their sometimes sessile (stalkless), sometimes shortly-stalked capsules, from four to twelve of which are usually joined together in concrete, boat-shaped masses termed synangia: these consist of two opposite rows of capsules, and open by slits down their inner faces. According to the various characters of this particular organ, the genus, although small, is divided into three distinct sections, as follow:

Eumarattia (Eu-mar-at′-tĭ-a), or true Marattia, *Swartz;* in which the synangia are furnished with an obscure, fimbriated involucre (fringed covering).

Eupodium (Eu-pod′-ĭ-um), *J. Smith;* with short-stalked synangia devoid of involucre.

Gymnotheca (Gym-noth-e′-ca), *Presl;* in which the synangia are devoid of involucre and stalkless.

The Marattias are highly ornamental, robust-growing Ferns, and although they do not form trunks, generally attain very large dimensions. Their stately fronds are produced from very thick, fleshy crowns, similar to those of *Angiopteris*, from which they are distinguished only by having the sori (spore masses) joined together and disposed in two opposite rows; while in the latter, the sori, although very close together, are not concrete, but distinct and separable. Most of the known species have the fronds bipinnate (twice divided to the midrib), but occasionally they are tri- or quadripinnatifid and of a peculiar nature, having distinctly articulated leaflets and leafits. All are of a more or less thick and fleshy substance, and are rendered most attractive through the singular appendages surrounding the base of the stalks, which are also jointed, and which often assume the appearance of abnormal fronds. A peculiarity of this genus is that it produces most of the edible Ferns known in cultivation. In New Zealand, the West Indies, Brazil, and Mexico, the succulent crowns of the various indigenous species are used by the natives as an article of food, either boiled, roasted, or baked.

Culture.

All Marattias being swamp-loving plants, they should be potted in a substantial compost, and the pots partially placed in water. A mixture of about equal parts of roughly-broken peat, loam, and river sand is one in which they thrive most luxuriantly, especially if given a good amount of heat. We have, however, seen *M. fraxinea elegans* stand in a cold Fernery for several consecutive years, and indeed make very good progress during the summer months, although resting in the winter; but it is, we believe, the only Marattia which will succeed under cold treatment.

Marattias possess an immense advantage over most, if not all, other gigantic-growing Ferns, inasmuch as, if they are accidentally allowed to get dry at the roots, the fronds and their divisions, being jointed and of a fleshy nature, hang down and become quite flabby—a state in which they have the faculty of remaining a comparatively long time without sustaining any serious damage. It is, however, advisable, when plants in that condition are detected, to give water at the roots at once, when the fronds will speedily regain their former stiffness without showing a trace of having suffered from the mishap.

The *Marattiaceæ* are seldom propagated by means of spores, although these are abundantly produced, for they are said to germinate with difficulty ; our own experience points that way, as we have only once succeeded in getting some to germinate, notwithstanding that they have been sown in all possible states and under various conditions. The only instance of these plants having been propagated from spores, which has come to our knowledge, is that of Mons. C. Loury, Chef de Cultures at the Jardin des Plantes, Paris, who, in 1887, succeeded in raising young plants of *M. Kaulfussii*, the two-year-old subjects being already, when we saw them at that age in 1889, of comparatively large dimensions. Since the publication of the part bearing on *Angiopteris* (Vol. I., p. 398), we have ascertained that the same cultivator also raised *A. evecta* from spores. In a personal letter relating to the subject, he states that these were fifteen months before showing any signs of germination, but that when once started the prothalli rapidly acquired extraordinary dimensions, and that, on account of their great size and of the conspicuously undulated character of their edges, these were easily detected among other prothalli of different species of Ferns. Mons. Guignard, Professeur à l'Ecole Supérieure de Pharmacie de Paris, to whom some of these most interesting subjects were handed for scientific examination, states that these organs, comparatively to those of other kinds of Ferns, are much developed, and sends us a sketch of a prothallus, natural size, measuring 1in. in length, ½in. in breadth, and showing a conspicuous depression *of both margins* in its centre.

Marattias are usually and readily increased by laying the basal scales of the fronds on a bed of constantly moist material, such as sphagnum moss, where they will be found to emit roots most freely, and to produce on each side of the scales little bulbous growths, which later on develop into plants similar to the parents.

Principal Species and Varieties.

M. (Gymnotheca) alata—Gym-noth-e′-ca ; al-a′-ta (winged), *Smith.*

This is a species of highly ornamental habit and strikingly distinct characters, native of the West Indies, Mexico, and Guatemala. Its magnificent fronds, 3ft. to 4ft. long and tripinnatifid (three times divided nearly to the midrib), are borne on robust stalks 1ft. to 2ft. long, 1in. or more thick, of

a fleshy nature, and deciduously scaly. The lower leaflets are the largest, and the ultimate divisions or segments, which are ½in. to ¾in. long, ¼in. broad, of a soft, papery texture, oblong in shape, blunt or pointed, with a wedge-shaped base, sometimes smooth, but usually finely toothed on their margins (Fig. 110), are quite unique in the genus. The same remark applies to the rachises (stalks of the leafy portion), which through their entire length are furnished with a very distinct and conspicuous wing. The synangia, which are copious and nearly marginal, have their sides erect and their attachment oblong or roundish.—*Hooker*, *Synopsis Filicum*, p. 442. *Nicholson*, *Dictionary of Gardening*, ii., p. 327.

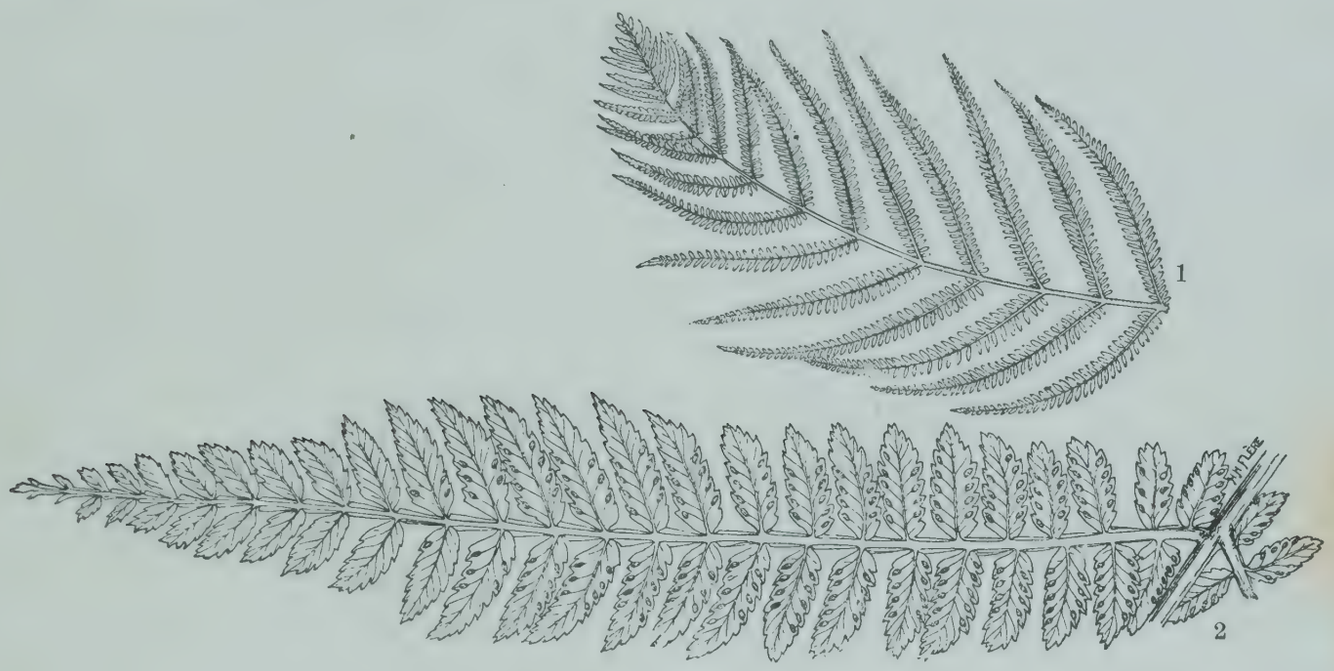


Fig. 110. (1) Upper Portion of Frond and (2) Pinnule of Marattia alata
(1, much reduced; 2, nat. size).

The spores of *M. alata* are produced freely; but, unfortunately, these seem to require for their germination, and especially for their full development, some kind of treatment apparently yet unknown to our cultivators. They have been tried by us at different periods, in various ways, and on diverse sorts of materials, but always with the same unsatisfactory results, never reaching above the prothallium stage: in this state some of them once remained during three years, gradually spreading, though not showing any signs of fronds, until at last they fell a prey to a fungoid growth which completely destroyed them.

M. arguta—ar-gu′-ta (sharply notched), *Mettenius.*

A garden plant, of which the native country has not been ascertained. Its very ample fronds are bipinnate (twice divided to the midrib) and furnished with broadly spear-shaped leaflets, which are divided into oblong-spear-shaped pinnules (leafits) of a somewhat leathery texture, 5in. to 6in. long, 1½in. broad, roundish at the base, sharp-pointed at the extremity, and furnished with sharp, unequal, incurved teeth along the margins. A few fringed scales of a rusty-brown colour are noticeable over the lower surface as also over the rachis (stalk of the leafy portion). The very small sori (spore masses) are elliptic, and disposed in synangia with five to six capsules on a side and not touching the base of the teeth.—*Hooker, Synopsis Filicum*, p. 525.

M. ascensionis—as-cen-sĭ-o′-nis (from Ascension Island). A variety of *M. fraxinea.*

M. (Eumarattia) attenuata—Eu-mar-at′-tĭ-a ; at-ten-ŭ-a′-ta (attenuated), *Labillardière.*

This robust-growing species, native of Australia and New Caledonia, has fronds 3ft. to 4ft. long, tripinnate (three times divided to the midrib), and borne on smooth, green stalks also 3ft. to 4ft. long. The leaflets, 1½ft. to 2ft. long, are all more or less distinctly stalked, the lower ones being furnished with a stalk fully 6in. long, two or three leafits on each side, and a terminal segment 4in. to 6in. long and 1in. or more broad, all wedge-shaped at the base and finely toothed at their summit. These leaflets are of a somewhat leathery texture, with both surfaces naked and the rachis (stalk of the leafy portion) not winged. The synangia are about ⅛in. long, their sides are upright, and the receptacle is linear (very narrow).—*Hooker, Synopsis Filicum*, p. 441. *Nicholson, Dictionary of Gardening*, ii., p. 327.

M. (Gymnotheca) cicutæfolia—Gym-noth-e′-ca ; cic-u-tæ-fol′-ĭ-a (Cicuta-leaved), *Kaulfuss.*

A purely Brazilian species, also known as *M. Verschaffeltiana.* Its ample fronds are of almost erect habit, 5ft. to 6ft. long, strictly bipinnate (twice divided to the midrib), and borne on stout, round stalks 1ft. to 2ft. long, 1in. thick, of a dark green colour, and entirely covered in their lower part

with brownish scales of a chaffy nature. The lower leaflets, 1ft. to 1½ft. long, are often 1ft. broad, and their oblong-spear-shaped pinnules (leafits), which are 4in. to 6in. long and about 1in. broad, have their base heart-shaped or slightly rounded, and their edge either entire or finely toothed. The leaflets are of a somewhat leathery texture and very dark green, with both surfaces naked; and the rachises (stalks) of the leaflets are slightly winged towards their extremity. The synangia, situated at a short distance from the edge, are about ⅛in. long, deeply cleft, with the sides ultimately spreading.—*Hooker*, *Synopsis Filicum*, p. 441. *Nicholson*, *Dictionary of Gardening*, ii., p. 327.

M. Cooperii—Coo′-per-ĭ-i (Sir Daniel Cooper's).

For the name of this bold and essentially distinct species we can find no authority. It is a native of New Caledonia, and, although unsurpassed for decoration in a warm conservatory, where it is most effective, still remains rare in cultivation. Its magnificent, massive, decompound (much-divided) fronds, 2½ft. to 3ft. long and 2ft. broad, rise from between two horny-looking appendages of a peculiarly rough nature, and are borne on succulent, blackish, round stalks 2ft. to 3ft. long, of a somewhat dull colour and wrinkled appearance, singularly contrasting with the smooth or shiny appearance of the leafy portion of the fronds. These fronds are bipinnate (twice divided to the midrib) in young specimens, but in plants that have attained their full development they are distinctly tripinnate and furnished with oblong pinnules (leafits) that are pointed at the extremity, deeply but irregularly toothed on the margins, of a leathery texture and dark green colour. The synangia, disposed in close rows near the margin of the leafits, have their sides vertical, and show from six to twelve capsules on each side.

Of all the Marattias in cultivation, *M. Cooperii* is perhaps the one most subject to the ravages of thrips and scale; but it may easily be kept clean, as it will endure fumigation without suffering in the least.

M. (Gymnotheca) Douglasii—Gym-noth-e′-ca; Doug-las′-ĭ-i (Douglas's), *Baker.*

This gigantic species, native of the Sandwich Islands, produces fronds 6ft. to 8ft. long, borne on thick, smooth stalks 3ft. to 5ft. long. The lowest

leaflets are much the largest, and all, except the lowest pair, are simply pinnate (only once divided to the midrib), 6in. to 8in. long, 2in. to 3in. broad, with rachises (stalks) flattened and narrowly winged throughout. The pinnules (leafits) are usually under 1in. long, ¼in. broad, linear-oblong, wedge-shaped at the base, and furnished with broad, blunt teeth on the margins; the pinnules of the lowest leaflets are again pinnatifid (divided nearly to the midrib). The synangia are disposed one to each lobe of the leafits, and are situated close to their margin, with the sides ultimately spreading.—*Hooker*, *Synopsis Filicum*, p. 441.

M. elegans—e′-leg-ans (elegant). A form of *M. fraxinea*.

Fig. 111. Portion of Pinna of Marattia fraxinea
(⅓ nat. size).

M. (**Eumarattia**) **fraxinea**—Eu-mar-at′-tĭ-a; frax-in′-ĕ-a (Ash-like), *Smith*.

This noble-looking plant, of very large dimensions, has a wider range of habitat than any other known species, being found on the Guinea Coast, in Angola, Zambesi-land, the Mascarene Islands, Natal, Cape Colony, Ceylon, the Philippine and Polynesian Islands, New Zealand, Queensland, and Norfolk

Island; also in Southern India, where, according to Beddome, it grows abundantly in Sisparah Ghat, in the Bolamputty Valley on the Coimbatore Hills. Its gigantic fronds, twice pinnate or casually thrice divided to the midrib, are 6ft. to 15ft. long, and borne on stalks 1ft. to 2ft. long, 1½in. thick, deciduously scaly and swollen in the lower part. The pinnæ (leaflets), 1ft. to 2ft. long and often 1ft. broad, are provided with oblong-spear-shaped leafits 4in. to 6in. long, 1in. to 1½in. broad, of a leathery texture, sharply pointed at their extremity, wedge-shaped or slightly rounded at their base, and entire or slightly toothed on their margins. Both surfaces are naked, and the rachises (stalks of the leafy portion) are sometimes slightly winged. The synangia, disposed in close rows near the margin of the leafits (Fig. 111), are about ⅛in. long; they have their sides upright, and are composed of from six to twelve capsules on each side.—*Hooker*, *Synopsis Filicum*, p. 440. *Nicholson*, *Dictionary of Gardening*, ii., p. 327. *Beddome*, *Ferns of Southern India*, t. 79.

Of the many varieties of *M. fraxinea* known in cultivation, the most distinct are the following:

M. f. ascensionis—as-cen-sĭ-o′-nis (from Ascension Island), *J. Smith.*

This curious variety, which is the same plant as *M. purpurascens* of De Vriese, and the smallest of all known Marattias, is, as its name implies, a native of the Island of Ascension. It is particularly striking on account of its very compact habit and the heavy dark green or lurid-purple colour of its fronds, which seldom attain more than 3ft. in height, and rise from between two succulent and leafy appendages attached to their base, as in *M. Cooperii*, but of a smoother nature. The lower pinnules (leafits) are often cut down to a distinctly-winged rachis (stalk), and the leafy appendages at the base of the stalks sometimes produce lobes like the frond in texture.—*Hooker*, *Synopsis Filicum*, p. 441.

M. f. elegans—e′-leg-ans (elegant), *Endlicher.*

An easily-grown and highly-decorative form, found abundantly in Norfolk Island and New Zealand alike, and one which can be used with great advantage in the cool conservatory all the year round, or for sub-tropical work during the summer months, when it produces quite a unique effect.

Its gigantic fronds, twice or occasionally three times divided to the midrib, and borne on stout, light green, round stalks, assume a much more horizontal position than those of most other plants in the genus. They often attain 7ft. in length, and are furnished with broad leafits of a bright shining green colour, finely notched on the margins, and principally at their extremity.

M. f. salicifolia—sal-ic-if-ol′-ĭ-a (Willow-leaved), *Schrader.*

A native of the Society Islands, with leafits sharply toothed throughout, often only ¼in. broad, and of a dark green colour. The synangia, which have only six capsules, are long and narrow, and are disposed further from the edge than in the species.

M. f. sambucina—sam-bu′-cin-a (Elder-like), *Blume.*

A native of Java, with leafits 2in. to 3in. long, ½in. broad, narrowed to both ends, and very pale beneath. The small synangia are placed half as far from the edge as from the midrib, and the rachis (stalk of the leafy portion) of the leaflets is more distinctly winged than usual.—*Hooker, Synopsis Filicum*, p. 441.

M. (Eupodium) Kaulfussii — Eu-pod′-ĭ-um ; Kaul-fus′-sĭ-i (Kaulfuss'), *J. Smith.*

This noble and distinct species, native of the West Indies, Colombia, Ecuador, and Rio Janeiro, is totally distinct in habit as well as in general appearance from any other cultivated kind. Its beautiful fronds, 3ft. to 4ft. long and quadripinnatifid (four times divided nearly to the midrib), are borne on thick, naked, round stalks 2ft. to 3ft. long, of a very light green colour, and totally deprived of scales ; these stalks are disposed in an almost perpendicular position, the leafy portion of the fronds being gracefully recumbent. The lowest leaflets are much the largest, being 1ft. or more long and 6in. to 8in. broad ; they are furnished with numerous small, deeply-toothed pinnules (leafits) 3in. to 4in. long, closely set along the very distinctly-winged rachises (stalks of the leafy portion), which also produce at intervals long, silvery, hair-like scales standing erect on the upper part of the fronds, which are of a most delightful pale green colour. This species differs also from all other members of the genus through the synangia not being

marginal ; they are deeply cleft and distinctly pedicellate (stalked).—*Hooker*, *Second Century of Ferns*, t. 95. *Lowe*, *New and Rare Ferns*, t. 17. *Nicholson*, *Dictionary of Gardening*, ii., p. 327.

M. (Gymnotheca) laxa—Gym-noth-e′-ca ; lax′-a (loose), *Kunze*.

A highly ornamental though somewhat coarse-growing Fern, of robust growth, native of Mexico, and distinct from most other Marattias through its airy, light appearance. Although its gigantic fronds, produced from a thick, short, and fleshy trunk or rootstock, are always of large dimensions, and borne on stout, light green, fleshy stalks 1ft. to 2ft. long, thickly covered at the base with grey, chaffy scales, yet the leaflets are set very loosely and have a peculiar deflexed character, which gives the whole plant a graceful appearance different from that of other much more massive species. The lower leaflets, 1½ft. to 2ft. long and often 1ft. broad, are furnished with oblong-spear-shaped leafits 4in. to 6in. long, 1in. broad, heart-shaped at the base, deeply toothed at the edges, of a somewhat leathery texture, and of a rich dark green colour ; their rachises (stalks of the leafy portion) are slightly winged towards the summit. The synangia, about one line long and disposed quite close to the edge of the leafits, have their sides always erect and their attachment linear (very narrow).—*Hooker*, *Species Filicum*, p. 441. *Nicholson*, *Dictionary of Gardening*, ii., p. 327. *Lowe*, *Ferns British and Exotic*, viii., t. 77.

M. purpurascens—pur-pur-as′-cens (purplish). This plant is identical with *M. ascensionis* of J. Smith, a variety of *M. fraxinea*.

M. salicifolia—sal-ic-if-ol′-ĭ-a (Willow-leaved). A variety of *M. fraxinea*.

M. Verschaffeltiana—Ver-schaf-fel-tĭ-a′-na (Verschaffelt's). Synonymous with *M. cicutæfolia*.

CHAPTER XXXVIII.

MATONIA, *Brown.*

(Mat-o′-nĭ-a.)

NAMED after Dr. Maton, Vice-President of the Linnean Society, the genus *Matonia*, which, being monotypic (composed of a solitary species, *M. pectinata*), represents a very small subdivision of the tribe *Cyatheæ*, and forms, in Hooker's "Synopsis Filicum," Genus 8. Besides the unique appearance of its foliage, *M. pectinata* is distinguished from all other Ferns by the singular conformation of the receptacle of its sori (spore masses), for that organ, of a firm, parchment-like nature, is expanded into a six-lobed, umbrella-shaped involucre, which covers six large, sessile (stalkless) capsules. The veins are forked and free, except those around the sori, which are closely reticulated or netted.

Culture.

Very little is known as to either the culture or the propagation of this, one of the rarest and handsomest of known Ferns, which, though at various times imported alive in this country, never seems to have made headway or even to have become established in any collection. Considering that it comes from Mount Ophir, Malacca, it should be as easily grown as some Cypripediums found wild in the same locality, which succeed admirably under artificial cultivation. Unfortunately, such is not the case; and although

subjected to the same treatment, *M. pectinata* has not been successfully grown in this country for any length of time. On account of its peculiar beauty, however, its culture well deserves to be tried again whenever opportunities arise.

M. pectinata—pec-tin-a′-ta (comb-like), *Brown.*

This Fern produces from a strong, creeping rhizome (prostrate stem) its curious and pretty, fan-shaped fronds, which are borne on slender stalks 6ft. to 8ft. long. Their leafy portion, 1ft. to 2ft. long and 1ft. to 1½ft. broad, is composed of leaflets of a hard, leathery texture, produced on the anterior (upper) side of the divergent branches, where they are pinnatifid (cut nearly to the midrib); they are of a smooth nature and frequently glaucous (bluish-green) beneath.—*Hooker*, *Species Filicum*, v., p. 286. *Nicholson*, *Dictionary of Gardening*, ii., p. 337. *Beddome*, *Ferns of British India*, t. 186.

CHAPTER XXXIX.

MENISCIUM, *Schreber.*

(Me-nis′-cĭ-um.)

THIS genus, which derives its name from *meniskos*, a crescent, in reference to the shape of the sori (spore masses), embraces a group of about ten very distinct species of stove Ferns, whose habitat is almost confined to the tropics. All the species at present known have fronds either undivided or simply pinnate (only once divided to the midrib), and in either case have their venation similar to that of the plants belonging to the better-known sub-division of *Polypodium* called *Goniopteris*, from which they differ only by the shape of their spore masses. In Hooker and Baker's "Synopsis Filicum" *Meniscium* forms Genus 54, and its distinctive characters reside in the narrow-oblong or linear (very narrow) form of the sori, which are disposed like so many areolæ (little cells) on the connivent transverse veinlets.

Culture.

Although the genus *Meniscium* comprises only a comparatively small number of species, these are sufficiently distinct to render it interesting; the majority of them are strong-growing, handsome plants, but one at least amongst them (*M. simplex*) is of such small dimensions that it is frequently used in Fern-cases, a purpose for which it appears particularly well adapted. Nearly all Menisciums have a beautiful venation quite peculiar to them; being

POLYPODIUM NIGRESCENS.

swamp-loving subjects, they are useful for planting in Ferneries near the margin of water, a place where few Ferns grow very satisfactorily. They thrive luxuriantly in a mixture of half loam and half fibrous peat, with a few pieces of crocks or charcoal intermixed. Though their roots, which are of a fleshy and brittle nature, are fond of moisture, they have a great dislike to stagnant water.

Menisciums are usually propagated by division of their crowns, but they may also be easily and more rapidly increased by means of their spores, which germinate freely when sown in a warm and moist position.

Principal Species and Varieties.

M. angustifolium—an-gus-tif-ol′-ĭ-um (narrow-leaved), *Willdenow.*

This species, of medium dimensions, which is distributed over a vast area, extending from the West Indies to Peru, has simply-pinnate (once-divided) fronds 1½ft. to 2ft. long and 1ft. broad, borne on firm, erect stalks 1ft. to 1½ft. long and of a slightly downy nature. The spreading leaflets, of a somewhat leathery texture, are 4in. to 6in. long, ¼in. to ¾in. broad, gradually narrowed to a sharp-pointed extremity, with their edge quite or nearly entire, and are wedge-shaped at the base and downy on the veins on the under-surface ; the lower ones are often stalked, the others are sessile (stalkless). The fertile leaflets are much narrower than the barren ones, and the sori (spore masses) are disposed four to six together between the midrib and the edge.—*Hooker*, *Species Filicum*, v., p. 164. *Nicholson*, *Dictionary of Gardening*, ii., p. 352.

M. cuspidatum—cus-pid-a′-tum (cuspidate, or gradually tapering into a sharp, stiff point), *Blume.*

A strong-growing species, native of the Himalayas, the Malaccas, and the Philippine Islands. Its simply-pinnate (once-divided) fronds, 2ft. to 4ft. long and 1ft. or more broad, are borne on stout, naked stalks 1ft. to 2ft. long. Both barren and fertile leaflets are of a somewhat leathery texture and of the same shape and dimensions ; they measure from 6in. to 9in. in length and 1in. to 3in. in breadth, are wedge-shaped or rounded at the base, where they are often slightly stalked, and terminate in a tapering point. The rachis

(stalk of the leafy portion) is naked or nearly so on both sides, and the spore masses are disposed six to twenty together between the midrib and the edge.—*Hooker*, *Synopsis Filicum*, p. 392. *Lowe*, *Ferns British and Exotic*, ii., t. 25.

M. giganteum—gig-ant-e′-um (gigantic), *Mettenius.*

This is a very distinct species, native of Peru, with simple (undivided) fronds 1½ft. to 2ft. long, 4in. broad, and borne on strong stalks 1ft. long, dark brown, and of a slightly downy nature. The leafy portion, which is of a soft, papery texture, elongate-oblong in shape, and narrowed rather suddenly at both ends, is slightly repand (bowed) on the margins, and has a tendency to become uneven or sinuate. The abundant sori (spore masses) are disposed thirty to forty together between the midrib and the edge.—*Hooker*, *Species Filicum*, v., p. 163. *Nicholson*, *Dictionary of Gardening*, ii., p. 352.

M. Kapplerianum—Kap-pler-ĭ-a′-num (Kappler's). Synonymous with *M. reticulatum sorbifolium.*

M. macrophyllum—mac-roph-yl′-lum (large-leaved). A form of *M. reticulatum.*

M. molle—mol′-lĕ (soft). A variety of *M. reticulatum.*

M. palustre—pal-us′-trĕ (marsh-loving). Synonymous with *M. serratum.*

M. pauciflorum—pau-cif-lo′-rum (few-flowered ?), *Hooker.*

A species with pinnate (once-divided) fronds 1ft. to 1½ft. long, 6in. to 8in. broad, borne on tufted, glossy, brownish stalks 6in. to 12in. long; it is a native of Sierra del Crystal, West Tropical Africa. The numerous leaflets, of a somewhat leathery texture, 3in. to 4in. long and seldom ¼in. broad, are set ½in. to ¾in. apart; they are very gradually narrowed from the middle to both ends, and have their edge sharply toothed. The sori (spore masses) are disposed in one or two rows between the midrib and the edge.—*Hooker*, *Species Filicum*, v., p. 164.

M. reticulatum—re-tic-ul-a′-tum (netted), *Swartz.*

This species, of very large dimensions; has a wide range of habitat, extending from Mexico and the West Indies to Brazil and Peru. Its ample

fronds, 2ft. to 4ft. long and 1ft. or more broad, are borne on stout, glossy stalks 1ft. to 3ft. long and of a brownish colour. The leaflets, of a somewhat leathery texture, 6in. to 12in. long and 1in. to 4in. broad, have their edge entire (undivided) or slightly undulated; they are either wedge-shaped or rounded at the base and terminate in a sharp point. The sori (spore masses) are disposed from eight to twelve between the midrib and the edge.—*Hooker*, *Species Filicum*, v., p. 165. *Nicholson*, *Dictionary of Gardening*, ii., p. 352.

Several varieties of this species are known in cultivation, the most distinct being the following:

M. r. macrophyllum—mac-roph-yl′-lum (large-leaved), *Kunze.*

This is a Mexican form, the chief characteristic of which is that it is furnished with a few large leaflets.

M. r. molle—mol′-lĕ (soft), *Mettenius.*

This variety, gathered in New Granada by M. Triana, has the rachis (stalk of the leafy portion) and the under-surface of its leaflets softly hairy; the leaflets are quite entire, about 1ft. long, 1in. broad, truncate (as if maimed) on the upper and rounded on the lower side at the base.—*Hooker*, *Synopsis Filicum*, p. 392.

M. r. sorbifolium—sor-bif-ol′-ĭ-um (Sorbus-leaved), *Willdenow.*

This variety, which is identical with the *M. Kapplerianum* of Fée, has narrower leaflets than usual, the lower ones being slightly stalked.—*Hooker*, *Synopsis Filicum*, p. 392.

M. salicifolium—sal-ic-if-ol′-ĭ-um (Willow-leaved), *Wallich.*

A species of medium size, native of Penang and Singapore, with fronds 1ft. to 1½ft. long, 1ft. broad, and borne on glossy, pale brown stalks 1ft. or more long. The leaflets, of a somewhat leathery texture and disposed from ¾in. to 1½in. apart, are very gradually narrowed from the middle to both ends, and have their edge nearly entire. The sori (spore masses) are disposed four or five between the midrib and the edge.—*Hooker*, *Species Filicum*, v., p. 164; *Second Century of Ferns*, t. 90.

M. serratum—ser-ra′-tum (saw-toothed), *Cavanilles.*

This very decorative species is a native of Mexico, the West Indies, Brazil, and Peru. It is also called *M. palustre*, and appears to be somewhat related to *M. reticulatum*, as its simply-pinnate (once-divided) fronds are of similar size (3ft. to 4ft. long and 1ft. or more broad), and borne on stout, glossy, brownish stalks 1ft. to 3ft. long. The leaflets, of a somewhat leathery texture, oblong-spear-shaped, with a heart-shaped base, and sharp-pointed at the extremity, are loosely set 1in. to 3in. apart; they are 6in. to 12in. long, ½in. to 2in. broad, finely toothed on the margin, very dark glossy green on the upper surface, and paler below, where the most beautiful venation, the principal attraction in the plant, is shown by alternate lines of very conspicuous ridges and furrows. The sori (spore masses) are disposed twelve to twenty between the midrib and the edge.—*Hooker*, *Species Filicum*, v., p. 165. *Nicholson*, *Dictionary of Gardening*, ii., p. 352. *Lowe*, *Ferns British and Exotic*, ii., t. 45.

Fig. 112. Meniscium simplex (⅛ nat. size).

M. simplex — sim′-plex (simple, undivided), *Hooker.*

This charming, miniature species, which Kunze considers as a simple form of *M. triphyllum*, is a native of Chusan, Hong-Kong, and Formosa. It is as totally different in habit and in general aspect as it is in size from any other species belonging to the genus. The barren and fertile fronds are similar in shape but entirely distinct: both are produced from a wide-creeping rhizome (prostrate stem) of a firm nature, and borne on slightly pubescent stalks 1ft. or more in length in the case of the fertile fronds, but only 4in. to 6in. long in the barren ones. Both kinds of fronds are simple (undivided), oblong-spear-shaped in general outline (Fig. 112), heart-shaped and sometimes auricled at the base, and somewhat undulated at

the margin; the barren ones are 6in. to 9in. long and 2in. to 3in. broad, the fertile ones are smaller, and both are of a somewhat leathery texture and dull green colour. The reddish sori (spore masses), disposed eight to twelve between the midrib and the edge, frequently become confluent and completely cover the under-surface of the fertile fronds.—*Hooker*, *Species Filicum*, v., p. 162; *Filices Exoticæ*, t. 83. *Nicholson*, *Dictionary of Gardening*, ii., p. 352. *Lowe*, *Ferns British and Exotic*, ii., t. 41.

This species is well adapted for growing in a Fern-case, where it thrives remarkably well, and makes a pleasing contrast with other Ferns of a lighter or more finely-divided character.

M. sorbifolium—sor-bif-ol′-ĭ-um (Sorbus-leaved). This is a variety of *M. reticulatum.*

M. Thwaitesii—Thwaites′-ĭ-i (Thwaites'), *Hooker.*

A small species, native of Ceylon, producing from a firm, wide-creeping rhizome (prostrate stem) fronds 8in. to 10in. long and 4in. to 5in. broad, borne on straw-coloured, nearly naked stalks 9in. to 12in. long. These fronds are composed of a terminal leaflet divided half-way to the midrib and several pairs of blunt, narrow-oblong, distinctly-stalked leaflets, the lowest the largest (2in. to 3in. long, ¾in. broad), of a thin, papery texture, with the edge bluntly lobed and the base suddenly narrowed. The sori (spore masses) are disposed four or five in the lower leaflets, between the midrib and the edge.—*Hooker*, *Synopsis Filicum*, p. 391. *Nicholson*, *Dictionary of Gardening*, ii., p. 352.

M. triphyllum—triph-yl′-lum (three-leaved), *Swartz.*

This small species, native of the Himalayas, South China, and the Malaccas, produces from a firm, wide-creeping rhizome (prostrate stem) barren and fertile fronds of different general aspect, the former being borne on slender and slightly downy stalks 4in. to 6in. long, whereas the stalks of the fertile ones are fully 1ft. in length. Seldom has either kind of frond more than one pair of leaflets besides the terminal one, which is oblong-spear-shaped, 4in. to 6in. long, 1in. to 1½in. broad, rounded or wedge-shaped at the base, and with the edge somewhat undulated; the lateral leaflets are of the same shape, but of smaller dimensions. The fertile fronds are similar

to the barren ones, but smaller. All are of a somewhat leathery texture, and their veins, which are abundant and very conspicuous, are slightly downy underneath. The whole plant is of a very dark green colour, and the sori (spore masses) are disposed six to nine between the midrib and the edge.—*Hooker, Species Filicum*, v., p. 163. *Hooker and Greville, Icones Filicum*, t. 120. *Nicholson, Dictionary of Gardening*, ii., p. 352.

MERTENSIA—Mer-ten′-sĭ-a. *See* **Gleichenia.**

MESOCHLÆNA—Mes-och-læ′-na. *See* **Didymochlæna.**

MICROGONIUM—Mi-crog-o′-nĭ-um. *See* **Trichomanes.**

MICROGRAMME—Mi-crog-ram′-me. *See* **Polypodium.**

MICROLEPIA—Mi-crol-ep′-ĭ-a. *See* **Davallia.** *M. anthriscifolia* is identical with *Hypolepis anthriscifolia* of commerce.

MICROSORIUM—Mi-cros-o′-rĭ-um. The plants formerly classed under this generic name are now divided by Hooker and Baker between **Nephrodium** and **Polypodium.**

CHAPTER XL.

MOHRIA, *Swartz.*

(Moh′-rĭ-a.)

Frankincense Fern.

DEDICATED to the memory of Daniel Mohr, a German botanist, who died in 1808, this genus is monotypic (comprising but one species, the African *M. caffrorum*, better known in gardens under the name of *M. thurifraga*). In Hooker and Baker's "Synopsis Filicum" *Mohria* forms Genus 66, and is a small division of the sub-order *Schizæaceæ*, combining the capsules peculiar to the plants comprised in the sub-order with the habit of *Cheilanthes*. Thus the sori (spore masses), which are disposed near the edge of the pinnules (leafits) and situated at the end of the forked veins, are enclosed in a two-valved, stalkless, nearly round capsule, opening vertically on the exterior side, and crowned by a complete, operculiform (lid-shaped) ring. By this means a distinct border of round prominences is formed along the edge of the frond on the under-side.

Culture.

M. caffrorum is of very easy culture: all that it requires in the way of soil is a mixture of about equal parts of peat, leaf mould, and sand, with the addition of small pieces of sandstone or soft brick-dust. Syringing overhead must be carefully avoided, or it will cause the fronds to turn brown and decay in a short time. The plant is essentially a greenhouse subject, and should receive all the light possible.

Propagation is readily effected from spores, which are abundantly produced, and which germinate very freely, producing young subjects in a remarkably short space of time.

M. achilleæfolia — ach-ill-e′-æ-fol′-ĭ-a (Yarrow-leaved). A variety of *M. caffrorum.*

M. caffrorum—caf-fro′-rum (native of Kaffraria), *Desvaux.*

This handsome Fern, popularly known as *M. thurifraga*, is a native of South Africa, Madagascar, and the Mauritius and Bourbon Islands. Being of a gracefully pendulous habit, and essentially distinct from any other drooping Fern, it is very useful for growing in hanging baskets of small or medium size, as its elegant fronds, produced from a close, tufted crown, and borne on stalks 3in. to 4in. long, more or less densely clothed with scales of a reddish-brown colour, sometimes attain 1½ft. in length and 4in. in breadth. The barren ones (Fig. 113) are tripinnatifid (three times divided nearly to the midrib), being furnished with oblong-spear-shaped leaflets, cut down to a narrowly-winged rachis (stalk) into leafits of a soft, papery texture, deeply cleft and again conspicuously toothed. The fertile fronds are longer than the barren ones, from which they also differ by being conspicuously contracted and by having their leaflets rounded at the edges : this contraction of the lobes over the spore masses gives them a very elegant appearance. The rachises and the under-surface of both kinds of fronds are more or less densely clothed with very narrow scales of a pale brown colour. When bruised, the plant emits a strong odour of frankincense.—*Hooker*, *Synopsis Filicum*, p. 436. *Nicholson*, *Dictionary of Gardening*, ii., p. 375. *Lowe*, *Ferns British and Exotic*, viii., t. 70.

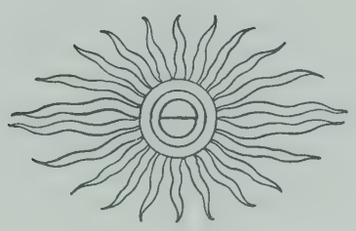
Fig. 113. Barren Frond of Mohria caffrorum (much reduced).

M. c. achilleæfolia—ach-ill-e′-æ-fol′-ĭ-a (Yarrow-leaved), *Moore.*

The barren fronds of this form much resemble the leaves of the Yarrow (*Achillea millefolia*). It is much dwarfer in habit than the type, being only

6in. to 9in. high, the barren fronds shorter and spreading, the fertile ones standing upright and much more finely divided, being almost quadripinnatifid (four times divided nearly to the midrib). Unfortunately, it increases but slowly, for, although fertile fronds are freely borne, we do not know of a single instance in which it has reproduced itself; and Lowe, at p. 104 of his excellent book on "New and Rare Ferns," gives it as his opinion that "one of the greatest proofs that this charming Fern is only a variety of *M. thurifraga*, is that spores carefully saved and sown have only produced the ordinary form of *M. thurifraga*." Its propagation is therefore confined solely to the division of the crowns—a very slow process, which no doubt accounts for its remaining so scarce in collections. This variety is also said to have a different scent, and to grow in more open places than the typical species.—*Hooker*, *Synopsis Filicum*, p. 436. *Lowe*, *New and Rare Ferns*, t. 42B. *Nicholson*, *Dictionary of Gardening*, ii., p. 375.

M. thurifraga — thu-rif′-rag-a (frankincense-scented). Synonymous with *M. caffrorum*.



MONACHOSORUM—Mon-ach-os-o′-rum. *See* **Polypodium.**

CHAPTER XLI.

MONOGRAMME, *Schkuhr.*

(Mon-og-ram′-me.)

Rush Ferns.

THIS genus, which forms a small division of the tribe *Grammitideæ*, is composed of small grass or rush-like plants with simple (undivided) fronds, and may be said to embrace the simplest in structure of all known Ferns. Though only about nine species are at present known, these are widely distributed over the globe, as representatives of the genus are found in Borneo, at the Cape of Good Hope, in Brazil, in Queensland, &c. The name is derived from *monos*, one, and *gramma*, writing, in allusion to the disposition of the sori (spore masses), which are arranged in a single row on one or both sides of the midrib of the narrow fronds. In Hooker and Baker's "Synopsis Filicum" *Monogramme* forms Genus 51, and is divided into two sections:

Eumonogramme (Eu-mon-og-ram′-me), or *Monogramme* proper, the fronds of which have a central vein only, and

Pleurogramme (Pleur-og-ram′-me), *Fée*, in which the fronds have some indistinct lateral veins in addition to the midrib.

Culture.

None of the species contained in this genus are of much value as decorative Ferns; they are, however, very interesting from a botanical point of view, and three or four of the strongest growers may even be used with

advantage for planting in warm Fern-cases. All require stove treatment, and need a very light peaty material to grow in.

Propagation is easily effected by division of the rhizomes (prostrate stems), which are usually of a slender, wide-creeping nature.

Principal Species.

M. dareæcarpa—da′-rĕ-æ-car′-pa (Darea-fruited), *Hooker.*

A very diminutive plant, native of Labuan and Borneo, with fronds seldom exceeding 1in. in length, and sori (spore masses) sunk in a deep cleft on one side of the midrib, the wing which covers it reaching nearly to the edge.—*Hooker*, *Species Filicum*, v., p. 121, t. 287A.

M. graminea—gra-min′-ĕ-a (grass-like), *Schkuhr.*

A little species, also known as *M. linearis*, with grass-like fronds of a soft, flaccid nature, seldom more than 2in. long, and sori (spore masses) disposed in a line near the apex or summit, where the edges are incurved. —*Hooker*, *Species Filicum*, v., p. 122.

M. graminoides—gra-min-ŏ-i′-dēs (grass-like), *Baker.*

A very small species, native of Brazil, St. Helena, and Jamaica, with fronds about 1½in. long, barely half a line broad, simple or once forked, and with a prominent midrib. The spore masses arise from the midrib near the enlarged point of the frond, the edge of which is scarcely incurved.—*Hooker*, *Species Filicum*, v., p. 121.

M. (Pleurogramme) immersa — Pleur-og-ram′-me ; im-mer′-sa (sunk, immersed), *Fée.*

This species, native of Cuba, Venezuela, and Guiana, has fronds 2in. to 3in. long, ⅛in. broad, tapering downwards into an indistinct stem, with the sori (spore masses) sunk in a deep, central, longitudinal cavity.—*Hooker*, *Species Filicum*, v., p. 125.

M. Junghuhnii—Jung-huhn′-ĭ-i (Junghuhn's), *Hooker.*

Though this may be considered a miniature Fern, native of Ceylon, Java, the Philippines, Queensland, and the Polynesian Islands, it is the

strongest-growing species of the whole genus. It forms little tufts of linear, filiform (thread-like) fronds, of a soft, papery texture and flaccid nature, 6in. to 12in. long, about half a line broad, usually simple, but occasionally forked, and presenting a very peculiar appearance, produced by the disposition of the spore masses: these are deeply sunk in a furrow on one side, or according to Brackenridge on both sides, of the midrib.—*Hooker*, *Species Filicum*, v., p. 123, t. 289B. *Beddome*, *Ferns of British India*, t. 210.

M. linearis—li-nĕ-a′-ris (very narrow). Synonymous with *M. graminea.*

M. rostrata—ros-tra′-ta (beaked), *Hooker.*

A species of medium size, native of Nicaragua, with fronds 3in. to 4in. long, one line broad, densely crowded in turf-like patches, tapering to the point and gradually downwards into an indistinct stem. They are of a leathery texture, with the surface naked, the midrib very distinct, and the sori (spore masses) quite sunk in a longitudinal furrow 1in. to 2in. long.—*Hooker*, *Species Filicum*, v., p. 122, t. 287B.

M. (Pleurogramme) seminuda—Pleur-og-ram′-me; se-min-u′-da (half-naked), *Baker.*

A distinct species, of comparatively large dimensions, native of the West Indies, Guatemala, and South Brazil. Its fronds, of a leathery texture and rigid nature, 4in. to 8in. long, $\frac{1}{8}$in. to $\frac{1}{6}$in. broad, tapering downwards into an indistinct stem, are densely crowded in turf-like patches. The sori (spore masses), which are not sunk in a cavity, are disposed in two rows close to the midrib: these ultimately become confluent, covering the whole of the upper part of the frond, the edges of which are more or less inflexed.—*Hooker*, *Species Filicum*, v., p. 124.

M. subfalcata—sub-fal-ca′-ta (somewhat sickle-shaped), *Hooker.*

This is a very small-growing species, native of the New Hebrides, producing from a slender, wide-creeping rhizome (prostrate stem) fronds of a somewhat leathery texture, seldom more than 1in. long and half-a-line broad towards the point, with sori (spore masses) sunk in an unequal-sided, longitudinal furrow.—*Hooker*, *Species Filicum*, v., p. 122, t. 219A.

M. trichoidea—trich-ŏ-i′-dĕ-a (hair-like), *J. Smith.*

A pretty and distinct species, native of the Philippines, producing from a very slender rhizome (prostrate stem) its thread- or hair-like fronds 3in. to 4in. long, densely crowded in turf-like patches. The fertile ones are dilated in two or three places for a space of ¼in., and there bear the spore masses in a longitudinal furrow, with a high raised edge on both sides.—*Hooker, Species Filicum*, v., p. 123.

MYRIOPTERIS—My-rĭ-op′-ter-is. *See* **Cheilanthes.**

NEOTTOPTERIS—Nĕ-ot-top′-ter-is. *See* **Asplenium.**

CHAPTER XLII.

NEPHRODIUM, *Richard.*

(Neph-ro′-dĭ-um.)

Buckler Ferns.

THIS genus, which derives its name from *nephros*, a kidney, in reference to the shape of its spore cases, is a very important portion of the tribe *Aspidieæ*, which, on account of the character furnished by the shape of the involucre (covering of the spore masses) of the various plants which it comprises, has been divided, besides three small groups, into two large genera, viz.: *Aspidium* proper, in which the involucre, round and terminal on the veinlets, is fixed by the centre, and *Nephrodium*, an extensive group of plants, which in Hooker and Baker's "Synopsis Filicum" forms Genus 44, and which comprises about 300 species, varying much in size, texture, cutting, and venation. The plants belonging to the tribe *Aspidieæ* are distinguished principally by their sub-globose sori (nearly round spore masses), terminal on the veinlets, and furnished with a cordate-reniform (between heart- and kidney-shaped) involucre, which is attached to the frond by the sinus (depression). The two genera thus formed have a closely similar range of variation in cutting and venation, and it is by no means clear in which of the two several species should be placed. It must also be borne in mind that an Aspidium with an abortive or obliterated involucre is not distinguishable from a Polypodium, that the number of species which have been originally described as non-indusiate, in which a more or less (often very slightly) developed involucre has been afterwards found to exist, is very considerable,

and that no doubt more will be added to the list. In one form or another this genus is represented in nearly every part of the world.

A comprehensive classification of such an extensive group of plants required its division into various sections : accordingly there have been numerous sub-divisions of the genus such as the following, which for want of really permanent and distinguishable characters have now been abandoned. The principal of these were : *Abacopteris*, Fée ; *Amauropelta*, Kunze ; *Anisocampium*, Presl ; *Arthropteris*, J. Smith ; *Camptodium*, Fée ; *Diclosodon*, Moore ; *Dryopteris*, Schott ; *Haplodictyum*, Presl ; *Hemestheum*, Newman ; *Hypodematium*, Kunze ; *Lophodium*, Newman ; *Pachyderis*, J. Smith ; *Phegopteris*, Fée ; *Podopeltis*, Fée ; *Proferea*, Presl ; *Pycnopteris*, Moore.

As the genus *Nephrodium* at present stands, it is divided, according to the various kinds of venation observable in its species, into four distinct groups as follow :

Eunephrodium (Eu-neph-ro′-dĭ-um), or true *Nephrodium*, *Richard.* The plants forming this group have only their lower veinlets united.

Lastrea (Las′-tre-a), *Presl.* In this group the plants have all their veinlets free.

Pleocnemia (Plĕ-oc-ne′-mĭ-a), *Presl.* In these plants the lower veinlets of contiguous groups are united, and, being pinnate in the lobes, form central arches.

Sagenia (Sag-e′-nĭ-a), *Presl.* All the veins in the plants of which this distinct group is composed are anastomosing (copiously intercrossing each other) ; they usually have free included veinlets.

The group *Lastrea*—by far the most important—is, for purposes of classification, subdivided into sections as follow :

I. Plants with fronds not cut down to the main rachis (stalk of their leafy portion), such as *N. decursivo-pinnatum* (popularly known under the name of *Lastrea decurrens*).

II. Species whose fronds have their leaflets either entire (undivided) or lobed less than one-third of the way down to the midrib, as observed in *N.* (*Lastrea*) *cuspidatum.*

III. The plants belonging to this section have their leaflets cut more than half-way down to the midrib into close, regular, entire or nearly entire lobes. The involucre in many, but not all the species, is thin and fugacious (not

lasting), and the lower leaflets are hardly, if at all, reduced. *N.* (*Lastrea*) *patens* is a very good illustration.

IV. A section composed of plants with leaflets cut nearly or quite to the midrib into toothed or pinnatifid lobes. One of the best representatives of this section is the popular *N.* (*Lastrea*) *erythrosorum.*

V. The species comprised in this section have their fronds small or of medium dimensions, tri- or quadripinnatifid (three or four times divided nearly to the midrib), and their involucre is of a firm nature and persistent. This section is well represented by *N.* (*Lastrea*) *spinulosum.*

VI. The plants of this section have small or medium-sized fronds, triangular, tri- or quadripinnatifid, and produced from a wide-creeping rhizome (prostrate stem), which characters are well shown in *N.* (*Lastrea*) *decompositum.*

VII. A section composed entirely of species of large dimensions, with ample, decompound (much-divided) fronds, 1½ft. to 2ft. long and 1ft. broad, and with involucre often small and fugacious. *N.* (*Lastrea*) *effusum* is a very good illustration.

Culture.

This genus includes many species remarkable for their decorative qualities, and others unequalled for their hardiness and power of endurance. Such a large group of plants must of necessity have a very wide geographical range: therefore we find in it kinds suitable for the tropical Fernery, for the greenhouse, and even for the open air; indeed, it is well represented in this country by several species and an almost endless list of varieties, all more or less curious or beautiful. Many of the kinds, too, are particularly interesting on account of their venation, but the principal reason why these plants are so popular lies in their constitution being so robust and their habits so accommodating. Plants of all dimensions are found amongst Nephrodiums, from the tiny-growing *N. pedatum* and *N. sanctum*, with fronds only a few inches long, to the majestic West Indian *N. villosum* or the beautiful and massive *N. Boryanum* from the Himalayas, both of which produce very handsome fronds from 4ft. to 6ft. and even frequently 8ft. in length. Whatever be their size, however, Nephrodiums are all of easy culture, a property which market growers have not been slow in appreciating at its

full value, as may readily be observed by the thousands of different kinds used for decorative purposes every season. Even the commonest of all, *N. molle*, which for years was considered no better than a weed, has of late sprung into commercial popularity: its rapid growth, and the handsome shape which it assumes when properly cultivated, greatly contribute to make it a most valuable addition to the already important list of decorative Ferns. When specimens of this species are planted out on the rockery, where all Nephrodiums seem to thrive, they soon become objects of great beauty; but, whether grown in that way or as pot plants, they require a richer soil than most other Ferns.

All the Nephrodiums thrive in a mixture of loam and peat, which, for the most robust kinds, should be in about equal proportions, with a small part of cow-manure previously dried and well mixed together, and an additional sprinkling of silver sand; for the smaller and consequently slower-growing species, less loam and more sand should be used.

Most Nephrodiums, especially the strong-growing kinds, are quite indifferent as to shading; a little sunshine acts as a strengthening agent, making their foliage much more lasting during the winter months than could otherwise possibly be the case. They all require a good supply of water at the roots all the year round, but principally during the growing season. Although they do not actually suffer from occasional waterings overhead, it is very doubtful if they derive any benefit therefrom: the foliage of many kinds being of a soft texture, soon gets spotted and loses its beauty if allowed to remain in a wet condition for any length of time. In any case, the plants must not be kept close; confinement in the case of Nephrodiums means not only an invasion of thrips, their greatest enemy, but also that brownness of mature fronds which often puzzles the amateur grower, but which, by the practical man, is never mistaken for insect depredations. The only way to avoid such unhealthy appearances is to grow the plants in well-ventilated houses, where moisture cannot condense on their foliage.

Nephrodiums are easily and rapidly propagated by means of their spores, which are abundantly produced and germinate very freely: the species provided with creeping rhizomes may also be increased by the division of these organs, which operation is most successfully performed during the months of March and April.

Principal Species and Varieties.

N. (Eunephrodium) abortivum — Eu-neph-ro′-dĭ-um ; ab-or-ti′-vum (abortive), *J. Smith.*

A stove species, of comparatively small dimensions, native of Penang, Java, and Ceylon. Its fronds, of a soft yet firm texture, 1ft. to 2ft. long and 6in. to 8in. broad, are borne on tufted, firm, erect, and quite naked stalks 6in. to 12in. long. The central leaflets, 3in. to 4in. long and not quite 1in. broad, are cut about one-third of the way down into close, entire lobes ; the lower leaflets are distant, and are suddenly reduced to mere auricles (ears). The veinlets are from six to eight on a side, and the sori (spore masses) are medial (disposed along the midrib).—*Hooker*, *Synopsis Filicum*, p. 292. *Nicholson*, *Dictionary of Gardening*, ii., p. 440.

N. (Lastrea) abruptum—Las′-tre-a ; ab-rup′-tum (abrupt), *Baker.*

This is a strong-growing, stove species, native of Peru, with fronds 2ft. to 3ft. long, 1ft. or more broad, and borne on angular stalks 1½ft. long and of a slightly villous (downy) nature above. The leaflets, 6in. to 8in. long and of a somewhat leathery, rigid texture, are cut down to a broadly-winged stalk into close, sharp-pointed, entire lobes, the basal ones rather reduced, and the leaflets on the upper side cut off in a slight curve. The veinlets are prominent, twelve to sixteen on each side, with the spore masses near the extremity. *N. abruptum* of Presl is identical with *N. truncatum.*—*Hooker*, *Synopsis Filicum*, p. 263.

N. (Lastrea) acutum—Las′-tre-a ; ac-u′-tum (sharp-pointed), *Hooker.*

A stove species, of very distinct appearance, from South Brazil. Its fronds, deltoid (in shape of the Greek delta, Δ) and three or four times divided nearly to the midrib, are 1½ft. to 2ft. long and borne on straw-coloured stalks of a slightly scaly nature. The lowest leaflets are distinctly stalked, of the same deltoid shape, and unequal-sided ; their pinnules (leafits), spear-shaped, stalkless, and sharp-pointed, are cut down to a narrow wing into spear-shaped segments, the lowest of which are again pinnatifid. The whole of the leafy portion is of a thin yet somewhat leathery texture and of

a dull green colour. The spore masses are small and medial (disposed along the midrib).—*Hooker*, *Synopsis Filicum*, p. 286.

N. (**Lastrea**) **æmulum**—Las′-tre-a ; æm′-ul-um (rivalling), *Baker*.

This handsome British species, with which *Lastrea æmula* of Brackenridge, *L. recurva* of Newman, *L. fœnisecii* of Moore, Sowerby, Babington, and others, and *Nephrodium fœnisecii* of Lowe, are synonymous, is commonly called the "Hay-scented Buckler Fern" on account of the fragrance, much

Fig. 114. Frond of Nephrodium æmulum
(½ nat. size).

like that of newly-mown hay, which is emitted by the dried fronds when crumpled between one's fingers. It is a very distinct species, which, through its peculiarly crisped appearance, is readily distinguished from any other comprised in the genus. Its pretty fronds, which are sometimes quite triangular, but occasionally between spear-shaped and triangular, 1ft. to 1½ft. long, 6in. to 10in. broad, and borne on tufted stalks 1ft. long, densely covered

with narrowly spear-shaped scales, are three times divided to the midrib (Fig. 114). The lowest leaflets are much the largest, and these are divided into pinnules (leafits) concave in shape, on which account the plant is sometimes also called the "Concave Buckler Fern." The lowest of the leafits are larger than the others, and all are broadly spear-shaped, of a bright, pale green colour, and cut down to the rachis (stalk) below into deeply-cleft lobes that are much curled or crisped upwards. The whole of the leafy portion is of a papery texture; its upper surface is smooth and shiny, while the under-side is glandular. The fructification, which occupies the whole under-surface of the fertile fronds, consists of numerous circular sori (spore masses) disposed in two rows along the leaflets and their lobes, and eventually becoming confluent; these are covered by a uniform indusium having a jagged, uneven margin.—*Hooker*, *Species Filicum*, iv., p. 127; *British Ferns*, t. 20. *Nicholson*, *Dictionary of Gardening*, ii., p. 440. *Lowe*, *Our Native Ferns*, i., t. 34.

This Fern, of dimensions comparatively small for a Nephrodium, though occurring sometimes in dryish situations, is usually found in moist, sheltered, woody places, and on banks beneath hedges. Its habitats are somewhat localised: it is most abundant in the western portion of England, being found in many parts of Cornwall and Devonshire; also in Somersetshire, Sussex, and Cumberland; in Wales it is met with, though not plentifully, in Anglesey and Glamorgan; while in Scotland it is found in Forfarshire and Argyleshire, and in the Isles of Arran, Mull, North Uist, and Orkney. It is more plentiful in Ireland, being common in some parts of Antrim, Wicklow, Sligo, Galway, Clare, Cork, and Kerry.

The "Hay-scented Buckler Fern" is of easy culture, and may be grown with success in nearly any degree of shade, entirely excluded from the sun, or in a situation exposed to the action of its full rays; but in the latter position it is of less luxuriant habit, whereas in the shade it will unfold its fronds abundantly and make a noble object. It is an evergreen species, thriving best in a mixture of sandy loam and leaf-mould in about equal proportions.

N. æmulum is not given to much variety from the normal form, and of the several more or less constant varieties known, those described on the following page are the most distinct.

N. æ. angustipinnulum — an-gus-tip-in′-nul-um (having narrow leafits), *Moore.*

The peculiarity in this variety, originally found near Cushendall, in Antrim, consists in the pinnules (leafits) being more confluent, the lobes being irregularly shortened, and the teeth more evidently awned than in the type.—*Lowe, Our Native Ferns*, i., p. 333.

N. æ. ramosum—ra-mo′-sum (branched), *Clapham.*

This singular form, originally found at Hackness, only differs from the typical species in having twin fronds joined together at the base.—*Lowe, Our Native Ferns*, i., p. 333.

N. (Sagenia) alatum—Sag-e′-nĭ-a ; al-a′-tum (winged), *Wallich.*

A very distinct, robust-growing, stove species, native of Assam, Singapore, Java, and Borneo, producing from a creeping rhizome (prostrate stem) fronds 2ft. to 3ft. or more long, borne on rather distant stalks 1ft. to 2ft. long, but winged a long way down, sometimes almost to the base ; they are oblong in shape, and furnished with four or five pairs of distant, oblong or strap-shaped leaflets, on which the small and numerous sori (spore masses) are scattered without order, being covered by a small, heart-shaped involucre.—*Hooker, Species Filicum*, iv., p. 47. *Beddome, Ferns of British India*, t. 169.

N. (Lastrea) albo-punctatum—Las′-tre-a ; al′-bo–punc-ta′-tum (white-spotted), *Desvaux.*

This distinct and pretty, evergreen, stove species, native of Guinea, Natal, Angola, Fiji, &c., possesses an entirely original character, and at first sight has all the appearance of an elegantly-variegated Fern, owing to the upper surface of its leaflets being dotted all over with small white spots. Its fronds, 9in. to 12in. long and 4in. to 6in. broad, are produced from a slender, wide-creeping rhizome (prostrate stem), and borne on naked, jointed stalks of a greyish colour. The pinnæ (leaflets) are spreading, 2in. to 3in. long, ½in. broad, and cut half-way or more down to the rachis (stalk of the leafy portion) into oblong, blunt, entire lobes. The fronds are of a soft, papery texture and of a very dark green colour above, thus showing to perfection the small, white dots with which they are adorned. The sori (spore masses)

are situated at the end of the veinlets, near the edge.—*Hooker*, *Species Filicum*, iv., p. 85 ; *Filices Exoticæ*, t. 89.

N. (Lastrea) alsophilaceum—Las′-tre-a ; al-soph′-il-a′-cĕ-um (Alsophila-like), *Baker.*

A stove species, of comparatively small dimensions, native of Rio Janeiro, with oblong-spear-shaped fronds 1ft. to 1½ft. long, bipinnatifid (twice divided nearly to the midrib), and borne on grey, smooth stalks about 6in. long. The peculiar, strap-shaped leaflets are all, except the uppermost, distinctly stalked, the lower ones 5in. to 6in. long, many of them reduced at the base and cut down to a broad wing into close, entire, somewhat sickle-shaped lobes of a firm, parchment-like texture and bright green colour. The small and medial sori (spore masses) are covered with a minute, fugacious (not lasting) involucre.—*Hooker*, *Synopsis Filicum*, p. 495.

N. (Eunephrodium) amboinense—Eu-neph-ro′-dĭ-um ; am-boi-nen′-sĕ (native of Amboyna), *Presl.*

This stove species, native of Ceylon and the Philippine and Malayan Islands, is very closely related to the common *N. molle*. It differs principally in the more papery texture of its fronds, which are of similar dimensions and habit, and also in the less hairy and less deeply-lobed nature of its bluntish and slightly sickle-shaped pinnules (leafits). The veins are pinnate, with four to six veinlets on each side, and the sori (spore masses) are disposed in rows close to the midrib.—*Hooker*, *Species Filicum*, iv., p. 75. *Nicholson*, *Dictionary of Gardening*, ii., p. 440.

N. (Lastrea) amplissimum—Las′-tre-a ; am-plis′-sim-um (very large), *Hooker.*

A stove species, native of Guiana and Brazil, with fronds 2ft. to 3ft. long, four or five times divided nearly to the midrib, and borne on brownish, naked stalks 1½ft. to 2ft. long. The lower leaflets, as well as their lower pinnules and segments, are deltoid (in shape of the Greek delta, Δ), stalked, and wedge-shaped on the lower side at the base ; their terminal lobes, blunt and oblong, are equal in the upper part of the leaflets, while in the lower part they are narrowed at the base. The fronds are of a moderately

firm texture and green on both surfaces, and their medium-sized sori (spore masses) are disposed one at the base of each upper terminal lobe, and covered by a smooth involucre of a somewhat persistent nature.—*Hooker*, *Synopsis Filicum*, p. 502.

N. (Lastrea) amplum—Las′-tre-a ; am′-plum (large), *Baker.*

This very robust-growing, stove species, whose habitat extends from the West Indies southward to Ecuador, is of much larger dimensions than the preceding one. Its massive fronds, 3ft. to 4ft. long and 2ft. or more broad, are borne on stalks 2ft. to 3ft. long, densely clothed at the base with an entangled mass of bright, silky scales. The lower leaflets are often 1ft. long and 6in. broad, while their pinnules (leafits), of a soft, papery texture, are spear-shaped, closely set, and cut down nearly or quite to the rachis (stalk of the leafy portion) into oblong, pinnatifid lobes. The numerous small sori (spore masses) are disposed close to the midrib, and covered by an involucre of a very fugacious (not lasting) nature.—*Hooker*, *Synopsis Filicum*, p. 285.

N. (Lastrea) angustifrons—Las′-tre-a ; an-gus′-tif-rons (narrow-fronded), *Baker.*

This is a peculiar and well-marked, greenhouse species, native of Nepaul, with fronds 2ft. long, 6in. to 8in. broad, produced from a wide-creeping rhizome (prostrate stem), and borne on dark stalks 1ft. to 2ft. long and slightly scaly. The leaflets, of a somewhat leathery texture, 4in. to 6in. long, and 2in. broad, are distant, spear-shaped, and flexuose (bending) ; their pinnules (leafits), of the same shape, are cut down to the rachis below into nearly quadrangular, toothed lobes, the veinlets of which are forked. The sori (spore masses) are disposed in rows close to the midribs of the leafits.—*Hooker*, *Synopsis Filicum*, p. 283. *Beddome*, *Ferns of British India*, t. 226.

N. (Lastrea) apiciflorum—Las′-tre-a ; ap-ic′-if-lo′-rum (flowering at the extremity), *Hooker.*

In general aspect, as well as in habit, this greenhouse species, native of Northern India, where it is found up to 9000ft. elevation, resembles *N. Filix-mas*, but it is remarkable on account of the fructification being restricted to the tips of the lobes, the sori (spore masses), six to eight to

a lobe, being confined to the upper third, and covered with a firm, prominent involucre. It is one of the most robust growers of the whole genus, its handsome fronds, produced from a short, stout, upright trunk clothed all over with light brown scales, forming a very effective, highly decorative plant of a pleasing light green colour.—*Hooker*, *Species Filicum*, iv., p. 112, t. 248. *Beddome*, *Ferns of British India*, t. 40.

N. (Lastrea) arborescens—Las′-tre-a ; ar-bor-es′-cens (arborescent), *Baker*.

A stove species, native of the Samoan Islands, with ample fronds, the lower leaflets of which often measure 1½ft. long and 8in. broad. The pinnules (leafits), distinctly stalked and spear-shaped, are 3in. to 4in. long, 1¼in. broad, and cut down to the rachis, except at the point, into spear-shaped and deeply-cleft segments of a soft, papery texture, with both surfaces naked, and veinlets pinnate (once divided) in the lobes of the segments. The small and abundant sori (spore masses) are disposed close to the midrib, and covered with a naked, firm, very distinctly reniform (kidney-shaped) involucre of a persistent nature.—*Hooker*, *Synopsis Filicum*, p. 286.

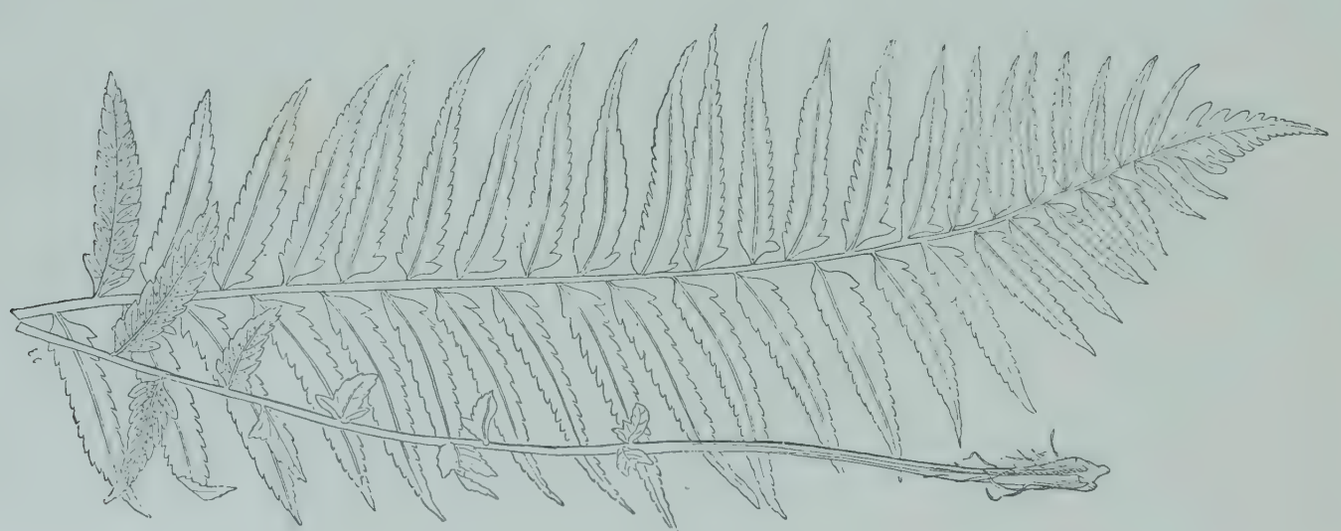


Fig. 115. Frond of Nephrodium Arbuscula
(½ nat. size).

N. (Eunephrodium) Arbuscula — Eu-neph-ro′-dĭ-um ; Ar-bus′-cul-a (little tree), *Desvaux*.

This handsome, stove species, of medium size and peculiarly distinctive in character, is a native of Ceylon, Amboyna, the Philippine, Solomon, and Mascarene Islands, the Neilgherries, and the Anamallay and Pulney Hills,

where, according to Beddome, it grows in beds of rivers at an elevation of 3000ft. to 4000ft. Its fronds, which are freely produced from a creeping rhizome (prostrate stem), are of a firm, parchment-like texture and borne on naked or slightly downy stalks 4in. to 8in. long; they are oblong-spear-shaped and measure 1ft. to 1½ft. in length and 6in. to 8in. in breadth. The leaflets, 3in. to 4in. long and ½in. broad, are slightly dented on the margin, closely set, and cut a quarter of the way (or less) down into blunt lobes, several of the lower pairs being short and distant (Fig. 115), much contracted, and frequently auricled (eared) above. The veinlets are distant, three or four on a side, and the sori (spore masses) are disposed in close rows. The whole of the plant is slightly hairy and of a most pleasing pale green shade. *N. Hookeri* is identical with this species.—*Hooker*, *Species Filicum*, iv., p. 74. *Nicholson*, *Dictionary of Gardening*, ii., p. 440. *Beddome*, *Ferns of Southern India*, t. 87.

N. (Eunephrodium) aridum — Eu-neph-ro′-dĭ-um; ar′-id-um (arid), *Baker.*

A gigantic-growing, stove species, native of Northern India, the Philippines, and the Malayan Islands; it is particularly well adapted for planting out in the warm conservatory, where its magnificent fronds, which are of a somewhat upright habit, can attain their full development. These fronds are produced from a thick, decumbent rhizome (prostrate stem), and borne on erect, round, naked stalks 1ft. or more long; they are 3ft. to 4ft. long, 1ft. to 1½ft. broad, and are furnished with leaflets 6in. to 9in. long, 1in. broad, of a leathery texture, and cut about one-third of the way down into nearly triangular, sharp-pointed lobes. The veinlets are from eight to ten on a side, and the sori (spore masses) are disposed in rows about midway between the midrib and the edge.—*Hooker*, *Synopsis Filicum*, p. 291. *Beddome*, *Ferns of British India*, t. 297.

N. (Lastrea) aristatum—Las′-tre-a; ar-is-ta′-tum (awned). Synonymous with *N. Otaria.*

N. (Eunephrodium) articulatum—Eu-neph-ro′-dĭ-um; ar-tic-ul-a′-tum (articulated). A synonym of *N. pennigerum.*

N. (Lastrea) ascensionis — Las′-tre-a ; as-cen-sĭ-o′-nis (from the Island of Ascension), *Hooker*.

A pretty, stove species, of small dimensions ; its fronds, somewhat triangular in shape, and borne on short, stout stalks densely clothed with narrow scales of a dark brown colour, seldom attain 1ft. in length and 6in. in breadth. The leaflets, of a somewhat leathery texture, are imbricated (overlapping), the lower ones 3in. to 4in. long, 2in. broad, and divided into narrow-spear-shaped pinnules (leafits) cut down to the rachis (stalk) into nearly entire (undivided), oblong lobes, at the base of each of which there is a sorus (spore mass).—*Hooker*, *Species Filicum*, iv., p. 124, t. 257.

N. (Eunephrodium) asplenioides—Eu-neph-ro′-dĭ-um ; as-ple′-nĭ-ŏ-i′-des (Asplenium-like), *Baker*.

This stove species, of medium dimensions, native of the West Indies, produces from a creeping rhizome (prostrate stem) fronds 1ft. to 1½ft. long, 4in. to 5in. broad, oblong in shape, simply pinnate (only once divided to the midrib) in their lower half, and borne on hairy stalks 6in. to 9in. long and of a greyish colour. The upper leaflets, closely set and entire (undivided), are oblong and blunt ; those next in order are connected by a wing to the rachis (stalk of the leafy portion), bluntly lobed one-third of the way to the midrib, 2in. to 3in. long, and ½in. broad ; the lowest are distantly placed and grow gradually shorter. The texture is somewhat leathery, and the stalks and under-surface are finely hairy. The sori (spore masses), which are particularly small, are disposed in rows near the midrib.—*Hooker*, *Species Filicum*, iv., p. 65.

N. (Lastrea) atratum—Las′-tre-a ; a-tra′-tum (dark-coloured). This is synonymous with *N. hirtipes*.

N. (Lastrea) attenuatum — Las′-tre-a ; at-ten-ŭ-a′-tum (attenuated, diminished), *Baker*.

A stove species, of large dimensions, native of the Philippine Islands, with ample fronds 3ft. to 4ft. long, 2ft. broad, and borne on firm, naked stalks 1ft. or more long and of a glossy nature. The leaflets, 9in. to 12in. long and about ½in. broad, are very acuminate (terminating in a long, tapering point), the edge being cut three-quarters of the way down into entire,

spreading, blunt lobes, the lower ones of which are much reduced. The leaflets are of a somewhat leathery texture and have the sori (spore masses) disposed in a close row near the midrib.—*Hooker*, *Synopsis Filicum*, p. 263.

N. augescens—au-ges′-cens (enlarged). A synonym of *N. serra*.

N. (Lastrea) aureo-vestitum—Las′-tre-a ; au′-rĕ-o–ves-ti′-tum (golden-clothed), *Hooker*.

This stove species, of medium dimensions, native of the West Indies, is particularly distinct on account of the bright golden colour of the long, narrow scales with which the stalks, about 6in. long, are densely clothed. The fronds, 1½ft. to 2ft. long and 6in. to 9in. broad, have their leaflets 3in. to 4in. long, about 1in. broad, and cut down to the rachis (stalk of the leafy portion) into narrow-oblong lobes ; they are of a soft, papery texture, and have their under-side naked, but the rachises are, like the stalks, furnished with bright golden-coloured, narrow scales. There are seven or eight veinlets on each side, and the sori (spore masses) are disposed in a row on each side of, and close to, the midrib.—*Hooker*, *Species Filicum*, iv., p. 101, t. 246.

N. (Lastrea) barbigerum—Las′-tre-a ; bar-big′-er-um (bearded), *Hooker*.

A greenhouse species, of medium dimensions, native of the Himalayas. According to Beddome, it is found in Kumaon, Simla, and Sikkim, at altitudes varying between 12,000ft. and 13,000ft. Its fronds, borne on tufted stalks 6in. to 12in. long and densely clothed with large, bright brown scales, and soft, silky hairs, are 2ft. to 3ft. long and 6in. to 12in. broad. The spear-shaped leaflets, 4in. to 6in. long and 1½in. broad, are closely set and divided into oblong, blunt pinnules (leafits), the lower ones deeply cleft into lobes copiously furnished with awned teeth, and with their edge often incurved. The texture is soft and papery. The sori (spore masses) are disposed in rows close to the midrib of the pinnules.—*Hooker*, *Species Filicum*, iv., p. 113. *Beddome*, *Ferns of British India*, t. 227.

N. (Sagenia) Barclayi—Sag-e′-nĭ-a ; Bar-clay′-i (Barclay's), *Baker*.

A species of medium dimensions, native of New Ireland, with fronds deltoid (in shape like the Greek delta, Δ), 1¼ft. each way, bipinnatifid (twice

divided nearly to the midrib), and borne on nearly naked stalks of a blackish colour. They are composed of a terminal pinnatifid leaflet and four pairs of lateral ones, the lowest stalked and cut down to the rachis (stalk) below into spear-shaped pinnules (leafits). The fronds are of a parchment-like texture, dark green on both surfaces, and the small and numerous sori (spore masses) are disposed in two series on each side of the midrib.—*Hooker*, *Synopsis Filicum*, p. 504.

N. (Sagenia) Barteri—Sag-e′-nĭ-a ; Bar′-ter-i (Barter's), *Baker*.

This strong-growing, stove species, native of Fernando Po, produces from a creeping rhizome (prostrate stem) fronds 2ft. to 3ft. long, 1ft. to 1½ft. broad, borne on straw-coloured, naked stalks 1ft. or more long. They are composed of an entire, oblong terminal leaflet 9in. to 12in. long, 3in. to 4in. broad, sharp-pointed at the extremity, and gradually narrowed to the base, and three or four pairs of similar lateral ones, all simple, the lowest slightly stalked. The fronds are of a somewhat leathery texture, with main veins distinct to the edge and ¼in. apart ; and the rather small sori (spore masses), disposed in two regular rows near the midveins, are covered with a minute involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 299.

N. (Lastrea) Beddomei—Las′-tre-a ; Bed-do′-me-i (Beddome's), *Baker*.

A stove species, closely related to the better-known *N. noveboracense*, but smaller, of a more slender nature, and of a firmer texture.—*Hooker*, *Synopsis Filicum*, p. 267.

N. (Lastrea) Bergianum—Las′-tre-a ; Berg-ĭ-a′-num (Berg's), *Baker*.

This greenhouse Fern, of medium dimensions, native of Cape Colony and Natal, and which, Baker says, is perhaps a variety of *N. patens* with lower leaflets gradually reduced, has fronds 1½ft. to 2ft. long, 6in. to 10in. broad, and borne on stalks 6in. to 12in. long, of a naked or finely hairy nature. The leaflets, of a soft, papery texture, 3in. to 5in. long and ¾in. broad, are cut down nearly to the rachis (stalk of the leafy portion) into close, entire lobes, more or less hairy on their under-side. The sori (spore masses), disposed along the midvein, are covered with a small involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 269.

N. (Lastrea) Blumei — Las′-tre-a ; Blu′-mĕ-i (Blume's). Synonymous with *N. intermedium.*

N. (Lastrea) Boivini—Las′-tre-a ; Boi-vi′-ni (Boivin's), *Baker.*

This gigantic-growing, stove species, native of Madagascar, is very distinct and ornamental. Its ample fronds, deltoid and quadripinnatifid (shaped like the Greek delta, Δ, and four times divided nearly to the midrib), have their lower leaflets also deltoid and stalked, 1½ft. long, 1ft. broad, and divided into oblong-spear-shaped pinnules (leafits) wedge-shaped on the lower side at the base. These fronds are of a thin but firm texture, and their final lobes are blunt and nearly entire, the upper ones being somewhat sickle-shaped. They are of a dark green colour on both surfaces ; the upper one is hairy, and the lower one is finely scaly on the ribs. The copious medium-sized sori (spore masses) are disposed close to the margin, and are covered by a fugacious involucre.—*Hooker*, *Synopsis Filicum*, p. 501.

N. (Lastrea) Bojeri—Las′-tre-a ; Bo′-je-ri (Bojer's), *Baker.*

A stove species, of medium dimensions, native of the Bourbon and Mauritius Islands, with fronds 1½ft. to 2ft. long and nearly as broad, borne on straw-coloured stalks 6in. to 9in. long, with spear-shaped scales at the base only. The leaflets are overlapping, spear-shaped, sometimes 1ft. long and 4in. broad, the lowest the largest ; while their pinnules (leafits) are cut down to the rachis (stalk) below into oblong-strap-shaped and almost entire lobes of a soft, papery texture and naked on both surfaces. The sori (spore masses) are distant from the midrib, and are covered by a naked involucre of a firm nature.—*Hooker*, *Species Filicum*, iv., p. 126.

N. (Lastrea) Boottii — Las′-tre-a ; Boott′-ĭ-i (Boott's). A variety of *N. spinulosum.*

N. (Lastrea) borneense—Las′-tre-a ; bor-ne-en′-sĕ (Bornean), *Hooker.*

This stove species, native of Borneo, is of somewhat similar habit to the better-known *N. flaccidum*, from which it is, however, quite distinct through the more leathery texture of its spear-shaped fronds : these are 1ft. to 1½ft. long, 4in. to 6in. broad, and borne on firm, erect, naked stalks 6in. long and of a brown colour. It also differs from that species through its fronds being

produced from a stout, wide-creeping, densely scaly rhizome (prostrate stem). The leaflets, 2in. to 3in. long and about 1in. broad, are cut down to a broadly-winged rachis (stalk) into narrow-oblong, notched lobes (Fig. 116), having about six veinlets on each side, with a sorus (spore mass) on each, disposed midway between the midrib and the edge, and covered by an involucre of leathery texture and of a persistent nature.—*Hooker*, *Species Filicum*, iv., p. 111 ; *Second Century of Ferns*, t. 93.

Fig. 116. Frond of Nephrodium borneense
(⅛ nat. size).

N. (Lastrea) Boryanum—Las′-tre-a ; Bo-rў-a′-num (Bory's), *Baker.*

A greenhouse species, of large dimensions, native of the Himalayas (Beddome states that it grows on the Anamallay Hills at 3000ft. elevation, and in Sholas about Ootacamund, on the Neilgherries, at about 7000ft.) ; it is also found in Moulmein, Java, and Bourbon. Its ample fronds, 6ft. to 8ft. long and 2ft. to 3ft. broad, are borne on straw-coloured or brownish stalks 2ft. to 3ft. long, and produced from a strong, creeping rhizome (prostrate stem) of a fleshy nature, furnished with numerous coarse roots. The lower pinnæ (leaflets), which are 1ft. to 1½ft. long and 6in. broad, are divided into lanceolate pinnules (spear-shaped leafits) 3in. to 4in. long and cut down to a winged rachis (stalk of the leafy portion) into blunt, spreading, more or less toothed lobes. The texture of the fronds is soft and papery, and the spore masses are disposed in rows near the midrib.—*Hooker*, *Species Filicum*, iv., p. 133. *Beddome*, *Ferns of Southern India*, t. 97.

N. (Lastrea) Brackenridgei — Las′-tre-a ; Brack-en-ridg′-ĕ-i (Bracken-ridge's), *Baker.*

A stove species, native of Viti and the Samoan Islands, with oblong-spear-shaped fronds 2ft. to 4ft. long and 1ft. to 1½ft. broad, borne on grey stalks 2ft. to 3ft. long. The lower leaflets, which are short-stalked and furnished with a gland at the base, are cut down nearly or quite to the rachis (stalk) into close, sickle-shaped, sharp-pointed pinnules (leafits) of a somewhat leathery texture and dull green on both surfaces. The very small sori (spore masses) are disposed close to the midvein, and are covered by a firm, smooth involucre of a persistent nature.—*Hooker*, *Synopsis Filicum*, p. 494.

N. (Lastrea) Braunianum — Las′-tre-a ; Brau-nĭ-a′-num (Braun's), *Hooker.*

This greenhouse species, of comparatively small dimensions, native of Columbia, has the general habit of plants of the section *Sagenia.* Its nearly triangular fronds, 1ft. to 1¼ft. long, 9in. broad, and borne on naked, blackish stalks 1ft. or more long, are cut down to a broadly-winged rachis (stalk) into pinnatifid (deeply-cleft) leaflets, of which the lowest pair are much the largest. The pinnules (leafits), of a soft, papery texture, have their lower side much developed and again pinnatifid, or cut into toothed, oblong lobes ¼in. broad. The small and numerous sori (spore masses) are disposed at the ends of the veins.—*Hooker*, *Species Filicum*, iv., p. 84.

N. (Lastrea) Brunonianum—Las′-tre-a ; Bru-no′-nĭ-a′-num (Brown's), *Hooker.*

A very distinct, greenhouse species, native of the Himalayas, and said by Beddome to occur at Kumaon at an elevation of 12,000ft., in the Sikkim-Himalaya at 13,000ft., and in the Punjab at 15,000ft. Its narrow fronds, which are borne on tufted, black stalks 4in. to 6in. long, densely covered with large, spear-shaped, dark brown scales, although measuring 1ft. to 1½ft. long, are seldom more than 4in. in breadth ; they are furnished with numerous close, unequal, oblong-spear-shaped, blunt leaflets cut down half-way to the rachis (stalk of the leafy portion) into sharply-toothed, blunt lobes. The texture is soft and papery, and the abundant sori (spore masses) are disposed

about midway between the edge and the midrib. Fig. 117 is reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author.—*Hooker*, *Species Filicum*, iv., p. 113, t. 251. *Beddome*, *Ferns of British India*, t. 37.

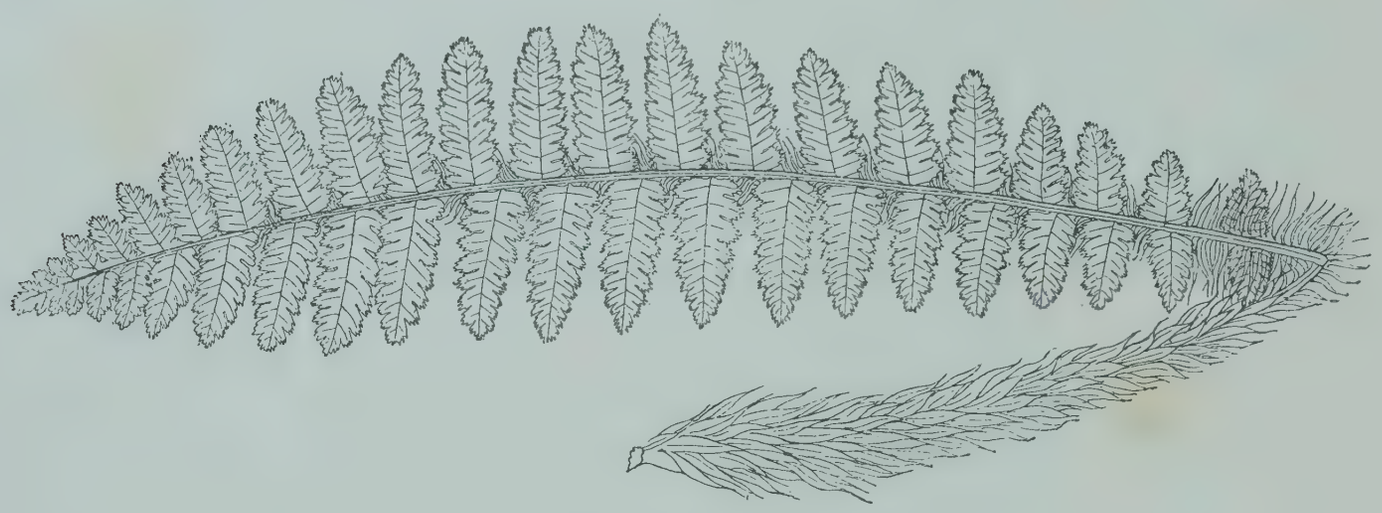


Fig. 117. Frond of Nephrodium Brunonianum
(¼ nat. size).

N. (**Lastrea**) **Buchanani**—Las′-tre-a ; Bu-chan′-an-i (Buchanan's), *Baker*.

A distinct, stove species, native of Bourbon and Natal, with fronds deltoid (shaped like the Greek delta, Δ), 1ft. to 2ft. each way, quadripinnatifid (four times divided nearly to the midrib), and borne on tufted stalks 6in. to 12in. long, brownish at the base, straw-coloured upwards, and densely clothed with narrow, dark brown scales. The lower leaflets, also deltoid, are the largest and unequal-sided ; the others are equal and spear-shaped : all are of a moderately firm texture, naked on both surfaces, and of a bright green colour. The final lobes are strap-shaped and blunt, and are faintly toothed on the outer edge. The rather large sori (spore masses) are disposed along the midveins, and are not found on the lower part of the pinnules (leafits) ; they are covered by a smooth involucre of a persistent nature.—*Hooker*, *Synopsis Filicum*, p. 499.

N. (**Lastrea**) **canum**—Las′-tre-a ; ca′-num (hoary), *Baker*.

A greenhouse species, somewhat resembling the better-known *N. molle*, from which it is mainly distinguished by being slenderer in all its parts.—*Hooker*, *Synopsis Filicum*, p. 267.

N. (Lastrea) catopteron—Las′-tre-a ; cat-op′-ter-on (winged downwards), *Hooker.*

This greenhouse species, native of Cape Colony, the Mascarene Islands, and the Guinea Coast, is of large dimensions, its ample fronds, borne on stalks 3ft. to 4ft. long and of a downy nature, usually measuring from 4ft. to 6ft. in length and from 2ft. to 3ft. in breadth. The lower leaflets are oblong-spear-shaped, 1ft. to 1½ft. long, and divided into close, spear-shaped pinnules (leafits), which in their turn are cut into oblong, bluntish, more or less deeply-cleft segments. The texture is soft and papery, the rachises (stalks of the leafy portion) are downy on both sides, their veinlets are forked, and the sori (spore masses) are covered by an indusium of firm texture.—*Hooker*, *Species Filicum*, iv., p. 137. *Nicholson*, *Dictionary of Gardening*, ii., p. 440.

N. (Lastrea) chinense—Las′-tre-a ; chi-nen′-sĕ (Chinese), *Baker.*

A greenhouse species, of comparatively small dimensions, native of China, Korea, and Japan. Its nearly triangular fronds, 1ft. to 1¼ft. long, 6in. to 9in. broad, and produced from a decumbent rhizome (prostrate stem), are borne on slender stalks about 6in. long, clothed throughout with narrow, dark brown scales ; they are furnished with only a few leaflets, the lowest much the largest, of a soft, papery texture. The abundant sori (spore masses) are distant from the midrib.—*Hooker*, *Synopsis Filicum*, p. 278.

N. (Lastrea) chrysolobum — Las′-tre-a ; chry-sol′-ob-um (golden-lobed), *Fée.*

This very pretty, greenhouse species, of small dimensions, native of Brazil and Columbia, though still rare in cultivation, is of great decorative value. Its elegant little fronds, 6in. to 9in. long, 3in. to 4in. broad, and borne on slender, tufted stalks 4in. to 6in. long, of a downy nature, have their leaflets cut down nearly to the rachis (stalk of the leafy portion) into close, blunt, entire lobes, the lowest pair deflexed and slightly stalked. The peculiarity of this little Fern is the golden-downy nature of the under-surface of its fronds, singularly contrasting with the glossy nature and dark green colour of the upper surface. The veinlets are from six to eight on a side, and the sori (spore masses) are situated at their extremity.—*Hooker*, *Synopsis Filicum*, p. 262. *Nicholson*, *Dictionary of Gardening*, ii., p. 440.

N. (Sagenia) cicutarium—Sag-e′-nĭ-a ; cic-u-ta′-rĭ-um (Cowbane-like), *Baker.*

A rare, stove species, of medium dimensions, native of the Polynesian and Malayan Islands, the Neilgherries, the Himalayas (where it is found at 4000ft. elevation), Ceylon, &c. ; it also extends from Cuba and Mexico southward to Brazil and Peru. Its fronds, of an elongated-triangular shape, 1ft. to 2ft. long and borne on brownish stalks 1ft. or more long, have their extremity deeply pinnate (cleft to the midrib), with sinuated (wavy), spear-shaped lobes. The three or four pairs of leaflets below this are deeply pinnatifid (cut nearly to the midrib) or pinnate below. The fronds are of a soft, papery texture, bright green and smooth on both surfaces ; their main veins are distinct to the edge, and the rather large and somewhat kidney-shaped sori (spore masses) are disposed in two rows near the main veins and situated at the extremity of the free veinlets.—*Hooker*, *Species Filicum*, iv., p. 48. *Nicholson*, *Dictionary of Gardening*, ii., p. 440. *Lowe*, *Ferns British and Exotic*, vi., t. 45.

N. (Lastrea) cirrhosum—Las′-tre-a ; cir-rho′-sum (tendrilled), *Baker.*

A stove species, of comparatively small dimensions, native of the Island of St. Thomas, West Africa, with fronds 1ft. long and 6in. broad, borne on slender, tufted stalks 9in. to 12in. long and densely scaly, especially below. The leaflets, of a soft, papery texture, are cut down very nearly to the rachis (stalk) into narrow-oblong, entire lobes ; these have five or six veinlets on each side, with the sori (spore masses) nearly terminal.—*Hooker*, *Species Filicum*, iv., p. 92, t. 244.

N. (Lastrea) Clarkei—Las′-tre-a ; Clar′-kĕ-i (Clarke's), *Baker.*

This greenhouse species, native of Sikkim, is intermediate between *N. apiciflorum* and *N. Filix-mas*, but quite different from either of these species in the general outline of its fronds, which are spear-shaped and gradually narrowed from the middle to both ends ; they vary from 1ft. to 2ft. in length, and from 3in. to 5in. in breadth, and are furnished with stalkless leaflets. The texture is also more leathery, and the sori (spore masses), disposed very close to the midvein, are covered by a firm, smooth, persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 497.

N. (Sagenia) coadnatum—Sag-e′-nĭ-a ; cŏ-ad-na′-tum (united), *Wallich.*

This pretty and particularly distinct, stove species is a native of the East Indies and the Island of Ceylon. Its smooth, elongated, triangular fronds, 2ft. to 3ft. long, produced from a stout, scaly, and somewhat creeping rhizome (prostrate stem), are bipinnate (twice divided to the midrib), being furnished with leaflets the inferior leafits of which are longer than the superior ones. The round and prominent sori (spore masses) are disposed close to the margin of the lobes.—*Lowe, Ferns British and Exotic*, vi., t. 50.

N. (Lastrea) cochleatum — Las′-tre-a ; coch-lĕ-a′-tum (spirally twisted like a snail-shell), *Don.*

This very curious Fern, native of the Neilgherries, where it is found at various elevations between 5000ft. and 6000ft., and of the Anamallay Hills and other localities, where it is abundant at from 2500ft. to 4000ft. elevation, has been described by some authors as a distinct species, whereas by others it has been considered as only a form of *N. Filix-mas.* Under cultivation it has retained its distinctive characters, which do not belong to the *Filix-mas* group, and which consist in peculiarities of the fertile fronds. Beddome, in his excellent work, says : "This very curious species is only to be found in fructification in cold weather. The fertile fronds, when they first appear in October or November, are quite contracted and covered with one mass of fructification ; they die off again in January or February. I have never detected any appearance of fructification on the broader sterile leaves, which are growing all the year round, and it is quite an error, I think, to suppose that the enlarged sorus is the effect of a disease." From Beddome's statement it will be seen that the fertile fronds are produced from a second and distinct growth, and not until the autumn, whereas the barren ones are produced all the year round ; also that while the fertile fronds are wholly contracted, the barren ones, of much larger dimensions, often measure 3ft. long. The latter are borne on stalks sometimes scaly, but often quite smooth, and rising from a stout, erect stem.—*Beddome, Ferns of Southern India*, t. 115.

N. (Lastrea) concinnum—Las′-tre-a ; con-cin′-num (neat), *Baker.*

A very distinct and pretty, stove species, whose habitat extends from Mexico to Chili. Its oblong-spear-shaped fronds, produced from a wide-

creeping rhizome (prostrate stem), and borne on naked or slightly hairy stalks 6in. to 12in. long, are 1½ft. to 2ft. long, 6in. to 8in. broad, and furnished with leaflets cut down nearly to the rachis (stalk) into spreading or sickle-shaped lobes of a somewhat leathery texture. There are from six to eight veinlets on each side, and the sori (spore masses), disposed close to the margin, are covered with a minute, ciliated, fugacious involucre.—*Hooker*, *Synopsis Filicum*, p. 268. *Beddome*, *Ferns of Southern India*, t. 247.

N. (Sagenia) confluens—Sag-e′-nĭ-a ; con′-flŭ-ens (cohering), *F. Mueller*.

A greenhouse species, of very distinct appearance, native of Queensland, with fronds deltoid (in shape of the Greek delta, Δ), 1ft. to 1½ft. each way, and tripinnatifid (three times divided nearly to the midrib). Their lowest leaflets, which are the largest and also deltoid, are unequal-sided and furnished with large, spear-shaped pinnules (leafits), the lowest of which are deeply lobed. The fronds are of a moderately firm texture, bright green on both surfaces, and densely hairy on the ribs. The large sori (spore masses), disposed in one row near the main veins, are covered with a small involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 504.

N. (Lastrea) costale—Las′-tre-a ; cos-ta′-lĕ (on the midrib), *Baker*.

This is a stove species, native of Venezuela, with broadly spear-shaped fronds 1½ft. long, furnished with numerous sessile (stalkless) leaflets, strap-shaped and sharp-pointed, 4in. long, 1in. broad, cut down to a narrow wing into blunt lobes of a parchment-like texture, smooth and of a dull green colour on both surfaces. The densely-produced sori (spore masses) are disposed on the midvein, and covered with a persistent, reddish, kidney-shaped, and bristly involucre.—*Hooker*, *Synopsis Filicum*, p. 495.

N. (Lastrea) crassifolium — Las′-tre-a ; cras-sif-ol′-ĭ-um (thick-leaved), *Hooker*.

A stove species, of medium dimensions, native of the Philippines and the Malaccas, with fronds 1½ft. to 2ft. long, 8in. to 12in. broad, and borne on tufted stalks 1ft. or more long and of a slightly hairy nature. The leaflets, of a peculiarly thick, leathery texture, are 4in. to 6in. long, 1in. to 1½in. broad, and divided into blunt, sickle-shaped lobes reaching from half to

two-thirds of the way down to the rachis (stalk), the lower ones being distinctly stalked. The lobes have ten to twelve veinlets on a side, and the sori (spore masses) are situated close to the midrib.—*Hooker*, *Species Filicum*, iv., p. 114. *Beddome*, *Ferns of British India*, t. 199.

N. (Eunephrodium) crinipes — Eu-neph-ro′-dĭ-um ; cri-nip′-ēs (hairy-footed), *Hooker.*

This strong-growing, stove species, is a native of the sub-tropical region of Sikkim-Himalaya, where it is found at an altitude of 1000ft. Its fronds, 2ft. to 3ft. long and 8in. to 12in. broad, are borne on stout, erect stalks 1ft. to 1½ft. long, densely covered with long, shaggy, dark brown scales which extend from their base about half-way up the leafy portion. The whole plant is of a peculiarly upright habit and hairy throughout. The leaflets, which affect a position more horizontal than usual, are 4in. to 6in. long, about ¾in. broad, and deeply toothed—in fact, cut half-way down to the rachis (stalk) into close, narrow-oblong lobes of a soft, papery texture, dark green above, and naked on both sides. The lobes have six to eight veinlets on a side, and the sori (spore masses) are disposed close to the midvein.—*Hooker*, *Species Filicum*, iv., p. 71. *Beddome*, *Ferns of British India*, t. 263.

N. (Lastrea) crinitum—Las′-tre-a ; cri-ni′-tum (hairy), *Desvaux.*

A stove species, native of Mauritius and Bourbon Island, with broadly-triangular fronds 1ft. to 2ft. long, 8in. to 12in. broad, borne on stout, upright stalks 6in. to 12in. long, densely clothed with purplish-brown, narrow, curly scales. The leaflets, 4in. to 6in. long, 1in. broad, and of a soft, papery texture, are cut down nearly to the rachis (stalk) into slightly sickle-shaped, narrow-oblong lobes in which there are nine to twelve veinlets on a side, with the sori (spore masses) disposed along the midvein.—*Hooker*, *Species Filicum*, iv., p. 111.

N. (Lastrea) cristatum—Las′-tre-a ; cris-ta′-tum (crested), *Michaux.*

It is not very clear why this hardy species, native of Central and Northern Europe, from the British Islands to the Ural Mountains and the Caucasus, also of various parts of North America, was named *cristatum*, as its fronds never show any sign of cristation. Its popular name, however, in this country is

"Crested Shield Fern," or "Crested Buckler Fern," and in America it is known as the "Crested Wood Fern." According to Eaton, it is found growing in swampy woods and wet thickets, sometimes in wet meadows or open bogs, from Newfoundland and New Brunswick to the Slave River and Lake Winnipeg, and extending southward to West Virginia, Kentucky, and Arkansas. The same authority adds that in the United States it is less abundant than *N. marginale* and *N. Thelypteris*, but commoner than *N. Goldieanum*. As a Fern indigenous to Great Britain it is very local.

N. cristatum is a singular and beautiful species, of upright habit. Its narrow-oblong, spear-shaped fronds, usually 1ft. to 1½ft. long, 3in. to 5in.

Fig. 118. Frond of Nephrodium cristatum
(⅛ nat. size).

broad, and borne on tufted stalks 6in. or more long, sparingly clothed with egg-shaped, light-coloured scales, are rendered very attractive through the bold character of their fructification, which is almost black soon after the indusium (covering) has been shed. They are produced from a rootstock creeping just below the surface of the ground, 5in. to 6in. long, chaffy with large, thin, light brown, ovate scales, which also cover the stalks and are more or less persistent on the lower part of the stalks. The leaflets, of a soft, papery texture, are broadly triangular near the base, being more elongated near the centre of the frond (Fig. 118); they are cut down nearly, or quite, to the base below into broad, blunt, oblong, slightly-cleft pinnules (leafits),

which are also of a blunt nature. The fructification usually occupies the upper half of the frond; the numerous round sori (spore masses) are disposed close to the midvein, and covered with a flat, kidney-shaped involucre of a fugacious nature.—*Hooker*, *Species Filicum*, iv., p. 121. *Nicholson*, *Dictionary of Gardening*, iv., p. 573. *Lowe*, *Ferns British and Exotic*, vi., t. 20. *Eaton*, *Ferns of North America*, ii., t. 66.

Considered as a purely British species, the Crested Buckler Fern is one of our rarest plants. It has been found on boggy heaths, among coarse grass, at the Lows, on Holt Heath; at Fritton, near Yarmouth, in Suffolk, and on Surlingham Road, near Norwich, in Norfolk; at Westleton and at Bexley, near Ipswich, in Suffolk; on Oxton Bogs, in Nottinghamshire; near Madeley, in Staffordshire; and on Wybunbury Bog, in Cheshire. In Ireland it has been discovered at Rathronan, near Clonmel. There are no records of its having ever been found either in Scotland or in the West of England. In Gerarde's "Herbal," edited by Dr. Johnson, the latter says that "it then (1633) grew plentifully in the boggy, shadowy moors near Durnford Abbey, in Sussex, and also on the moist, shadowy rocks by Maple Durham, near Petersfield, in Hampshire." Ray, in his "Historia Plantarum," also states that Mr. Goodyer had found it, not only in Sussex, but also in many other places in England. In its native situations it appears to prefer growing on the sides of large tufts of *Aira cæspitosa* and other swamp-loving grasses.

Owing to its native places being boggy situations, *N. cristatum* is somewhat difficult to grow successfully for any length of time. As an outdoor Fern, if planted in peaty soil near the water, it will flourish as well as in its native habitat, but in less favourable situations it will become weaker every year, until it finally, in two or three years, dies. Mr. W. Reeve, who grew it most successfully, gives the following directions for its cultivation: "The *Lastrea cristata* is a very useful plant for adorning the moist, shady parts of the rockery and shrubbery, as well as for growing in pots. Those who wish to grow it as a pot plant must drain well and give the plants a compost of loam and fibrous peat in equal parts, with a free admixture of silver sand; and plenty of room will be required as the plant increases in size. It prefers being grown in a damp, shady, and cool rather than hot situation. When grown in a high temperature, the unfolding fronds become long and weak, the plant loses its beauty and oftentimes damps quite off, or dwindles away.

It is well adapted for damp, shady places, the shaded part of a rockery included, where it will grow well in a compost of loam and peat with a little grit (fine stones or small crocks) mixed with it. It may be increased by sowing the ripe fructification, which will be in a fit state by the end of the summer. All plants in pots should be plunged, or other means taken to keep the roots constantly cool and moist."

Little variation, besides that resulting from the various habitats in which it is found growing spontaneously, is observable among the many plants of Crested Buckler Fern which have come under our notice, and the following are the only two accepted as distinct varieties :

N. c. Clintonianum—Clin-ton-ĭ-a′-num (Clinton's), *Eaton.*

This variety, of much larger dimensions than the typical species, is, according to Eaton, of essentially North American origin, "being found in Canada, New England, New York, New Jersey, Ohio, and Wisconsin, but not occurring in Europe." Its robust fronds, 2½ft. to 4ft. long, have their leaflets oblong-spear-shaped ; these are broadest at the base, where they are 4in. to 6in. long and 1in. to 2in. broad ; their divisions, more numerous than in the typical plant, and either crowded or somewhat distant, are narrow-oblong, blunt, and finely toothed ; the basal leaflets are sometimes pinnately lobed. The sori (spore masses), situated near the midvein, are covered with a roundish or kidney-shaped, naked, smooth indusium. According to the same authority, this variety has, in America, often been mistaken for *N. Goldieanum*, from which it palpably differs in having fertile and barren fronds unlike, also in the narrow outline of the fertile fronds, and especially in having all the leaflets broadest at the base instead of in the middle.—*Eaton, Ferns of North America*, ii., p. 156.

N. c. uliginosum—u-li-gin-o′-sum (marsh-loving), *Newman.*

This variety, which is of a much more upright habit than the species, is also of a more robust, or at least more enduring, constitution ; for, although constantly found growing in company with the species, it flourishes in the open Fernery in situations which would prove fatal to *N. cristatum.* It also differs from the species through its fructification ripening earlier in the summer—towards the middle of June instead of the end of July—and its

foliage fades away in autumn, shrivelling up in a similar manner to what is observed with the Lady Fern, whilst *N. cristatum* remains green far into the winter, its fronds not shrivelling up, but breaking near the ground and thus causing them to be prostrate long before they have faded away. The variety *uliginosum* is given in the "Synopsis Filicum" as a connecting link between *N. cristatum* and *N. spinulosum*, the barren fronds most resembling the former, and the fertile ones the latter. Both kinds of frond occupy an erect position and are borne on long stalks, which make them appear naked about half their length; they are broader than in the typical species; their pinnules or leafits, smaller and more numerous, are also more sharply pointed, more deeply cut, and furnished with sharp teeth at their extremity; and the fructification, of a conspicuous colour, extends over the whole under-side of the frond.—*Hooker*, *Synopsis Filicum*, p. 273. *Lowe*, *Ferns British and Exotic*, vi., p. 60.

N. (Lastrea) cubense—Las′-tre-a; cub-en′-sĕ (Cuban), *Baker.*

A stove species, native of Cuba, with much-divided fronds like those of the better-known *N. denticulatum*, but not so sharply cut.—*Hooker*, *Synopsis Filicum*, p. 501.

N. (Eunephrodium) cucullatum—Eu-neph-ro′-dĭ-um; cuc-ul-la′-tum (hood-like), *Baker.*

This stove species, of medium dimensions, native of Northern India, Ceylon, the Malaccas, and Fiji, has fronds 1ft. to 2ft. long and 8in. to 12in. broad, borne on strong, upright stalks of a brownish colour and nearly naked. The leaflets, 4in. to 6in. long and ½in. broad, are cut down one-third of the way to the rachis (stalk of the leafy portion) into triangular, sharp-pointed, somewhat sickle-shaped lobes of a leathery texture, the lower leaflets dwindling down suddenly to mere auricles. The sori (spore masses) are nearly terminal on the veinlets, eight to ten of which are found on each side of a lobe.—*Hooker*, *Species Filicum*, iv., p. 81.

N. (Eunephrodium) Cumingianum—Eu-neph-ro′-dĭ-um; Cum-ing-ĭ-a′-num (Cuming's), *J. Smith.*

This is a very distinct, stove species, of small dimensions, native of Panama, with ligulate (strap-shaped) fronds 3in. to 4in. long and ½in. to ¾in.

broad, gradually narrowed at both ends, entire (undivided) or slightly sinuated (wavy-edged); they are of a somewhat leathery texture, with both surfaces naked, and are borne on slender, naked stalks 2in. to 4in. long. The veins, which are forked, are disposed in groups of two or three on each side.—*Hooker*, *Species Filicum*, iv., p. 63.

N. (Lastrea) Currori—Las′-tre-a; Cur-ro′-ri (Curror's), *Baker*.

A stove species, of large dimensions, native of Equatorial Guinea, with ample fronds deltoid (in shape of the Greek delta, Δ) and four times divided nearly to the midrib. The lowest leaflets, produced on the lower side, are oblong-spear-shaped, stalked, 1¼ft. to 1½ft. long, 6in. to 8in. broad, and cut into pinnules (leafits) which are further divided into close, broadly spear-shaped, deeply-cleft lobes of a moderately firm texture, dull green on both sides, and thinly clothed with shining, brown hairs. The sori (spore masses), of medium size, are situated close to the midvein, and are covered with a smooth involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 500.

N. (Lastrea) cuspidatum—Las′-tre-a; cus-pid-a′-tum (pointed), *Baker*.

This greenhouse species, native of Ceylon, possesses qualities which render it most valuable either as a pot plant or as a distinct subject for the rockery. It is of compact habit and of easy culture, producing in abundance from a decumbent, fleshy stem its handsome fronds 2ft. to 3ft. long, 8in. to 12in. broad, borne on succulent, round stalks that are barely 1ft. long and densely furnished at the base with pale straw-coloured, chaffy scales. The leaflets, spear-shaped and sharply toothed on the margins, are of a somewhat papery texture and of a glossy dark green colour, which, however, is relieved by the beautiful and refreshing claret-colour of the stalks, the two tints forming a pleasing and most decided contrast. The sori (spore masses), disposed in rows close to the midvein, are covered with a fugacious involucre.—*Hooker*, *Species Filicum*, iv., p. 234. *Nicholson*, *Dictionary of Gardening*, ii., p. 440. *Beddome*, *Ferns of British India*, t. 118.

N. (Eunephrodium) cyatheoides—Eu-neph-ro′-dĭ-um; cy-ath-ĕ-ŏ-i′-des (Cyathea-like), *Kaulfuss*.

A very handsome, but rare, greenhouse species, native of the Sandwich Islands and Sumatra. Its ample fronds, simply pinnate (only once divided

to the midrib), 2ft. to 3ft. long, 1ft. or more broad, and borne on strong, naked, glossy, greyish stalks 1ft. to 2ft. long, are furnished with closely-set, spreading leaflets 4in. to 6in. long and about 1in. broad. These leaflets have their extremity sharp-pointed and their edge irregular and very deeply toothed ; they are of a somewhat leathery texture, of a pleasing light green colour, and their veinlets, disposed in groups of from ten to twelve on each side, often show a sorus (spore mass) on each, close to the main vein.—*Hooker*, *Species Filicum*, iv., p. 76, t. 241A. *Nicholson*, *Dictionary of Gardening*, ii., p. 440.

N. (Lastrea) davallioides — Las′-tre-a ; dav-al-lĭ-ŏ-i′-des (Davallia-like), *Baker.*

This large-growing, stove species, native of Fiji, Tahiti, and Samoa, produces from a stout, wide-creeping rhizome (prostrate stem) fronds 3ft. to 4ft. long and 2ft. or more broad, borne on strong stalks 1½ft. to 2ft. long, of a brownish colour, and densely scaly at the base only ; they are deltoid (in shape of the Greek delta, Δ), with lower leaflets 1ft. long and nearly as broad. The leaflets are divided into pinnules (leafits) of similar shape, and these in their turn are cut into either spear-shaped or deltoid segments, the lobes of which are deeply cleft. The texture is somewhat leathery, and the small and abundant sori (spore masses) are covered with a firm, kidney-shaped involucre.—*Hooker*, *Synopsis Filicum*, p. 287.

N. (Lastrea) decipiens—Las′-tre-a ; de-cip′-ĭ-ens (deceiving), *Hooker.*

A greenhouse species, of small dimensions, native of China, with broadly spear-shaped fronds 8in. to 10in. long and 4in. to 5in. broad, and spreading leaflets 2in. to 3in. long, with the edge very slightly but broadly toothed. These leaflets, of a somewhat leathery texture and naked on both surfaces, have their sori (spore masses) disposed in two rows near the midrib.—*Hooker*, *Species Filicum*, iv., p. 86, t. 243.

N. (Lastrea) decompositum—Las′-tre-a ; de-com-pos′-it-um (decompound, much cut), *R. Brown.*

This very handsome, greenhouse species, native of Australia, Tasmania, New Zealand, Tahiti, and the Fiji Islands, is very variable in size, cutting,

and texture. Its fronds, 1ft. to 2ft. long and 1ft. broad, are produced from a wide-creeping rhizome (prostrate stem) and borne on firm stalks 1ft. to 1½ft. long and scaly only at the base. They are broadly triangular, with their lowest leaflets much the largest (Fig. 119), sometimes measuring 9in. long and 4in. broad: these are divided into spear-shaped and more or less deeply-cleft pinnules (leafits), with unequal-sided, deeply-cleft, and lobed segments. The rachis (stalk of the leafy portion) and under-side of the frond, which is of a soft, papery texture, are more or less woolly, and the rather large and

Fig. 119. Frond of Nephrodium decompositum
(¼ nat. size).

prominent sori (spore masses) are placed midway between the midrib and the edge.—*Hooker*, *Species Filicum*, iv., p. 146. *Nicholson*, *Dictionary of Gardening*, ii., p. 440. *Lowe*, *Ferns British and Exotic*, vi., t. 33.

This species is of comparatively easy culture, and is altogether a most desirable plant. It is usually of medium growth, exceedingly useful for table-decoration, and also for forming an edging in the rockery in front of taller kinds, as it is of a neat and compact habit.

N. d. glabellum—glab-el′-lum (smoothish), *Cunningham.*

This is an exquisite variety, native of New Zealand, and differing from the species mainly in its dimensions and in the nature of its fronds. Its full

size is from 1¼ft. to 1½ft. high, but it is oftener seen as a compact little specimen not exceeding 1ft. in height. Its delicate and finely-divided fronds, produced in great abundance from an underground-creeping rhizome, are of a somewhat triangular form, and are borne on short, light-haired stalks, contrasting agreeably with the glossy nature of the leafy portion of the fronds.—*Hooker*, *Synopsis Filicum*, p. 281. *Nicholson*, *Dictionary of Gardening*, ii., p. 440.

N. d. glabellum is well adapted for pot culture, or for planting in nooks in the rockery where there is but little soil or space at disposal. It is also a capital plant for Fern-cases, as generally seen in dwelling-rooms, where it grows luxuriantly, its tender, soft green colour forming a striking contrast with plants of a darker hue. The beauty of this variety is readily destroyed by watering or syringing overhead, which causes the fronds, young or old, to assume a brownish, sickly appearance.

N. (Sagenia) decurrens—Sag-e′-nĭ-a ; de-cur′-rens (decurrent), *Baker.*

This must not be confounded with the plant usually found in collections as *Lastrea decurrens* of J. Smith (*N. decursivo-pinnatum* of Baker), which is totally different. The present one is a stove species, of large dimensions, native of Northern India, Ceylon, the Philippines, the Malaccas, Formosa, Aneiteum, Fiji, and Samoa. Its singular fronds, 2ft. to 4ft. long, 1ft. or more broad, are cut down to a winged stalk into four to eight pairs of sinuated (wavy-edged), narrow-oblong leaflets 6in. to 12in. long and 1in. to 2in. broad, the two lowest sometimes forked. They are of a somewhat leathery texture, and the large and prominent sori (spore masses) are disposed in two regular rows between the principal veins.—*Hooker*, *Species Filicum*, iv., p. 47. *Nicholson*, *Dictionary of Gardening*, ii., p. 440. *Beddome*, *Ferns of Southern India*, t. 245.

N. (Lastrea) decursivo-pinnatum—de-cur-si′-vo–pin-na′-tum (appearing as if pinnate, while the leaflets are connected with the stalk by a narrow wing), *Baker.*

This is the plant which in gardens is usually known as *Lastrea decurrens* of J. Smith. It is a greenhouse or half-hardy species, of small dimensions and of deciduous nature, native of Japan, China, and Formosa,

and one entirely distinct from any other species in cultivation. Its fronds, which are produced from a succulent, underground-creeping rhizome covered with chaffy, greyish scales, are borne on tufted stalks, which are 3in. to 4in. long and clothed throughout with narrow scales of a particularly light colour. These fronds are upright in habit, 1ft. or more in length, 3in. to 4in. broad, and furnished with narrow leaflets 1in. to 2in. long and ¼in. broad. The edges of the leaflets are more or less deeply cleft, and the bases are connected by a broad, lobed wing, the lower ones reduced and sometimes distinct. The texture is soft and papery, the under-side slightly hairy, and the copious scattered sori (spore masses) are covered with a minute indusium of a fugacious nature.—*Hooker*, *Species Filicum*, iv., p. 231 ; *Second Century of Ferns*, t. 49. *Nicholson*, *Dictionary of Gardening*, ii., p. 440. *Lowe*, *Ferns British and Exotic*, vi., t. 6.

N. (Lastrea) deltoideum—Las′-tre-a ; del-toid′-ĕ-um (delta-shaped), *Desvaux.*

Undoubtedly this beautiful, stove species, found at the same time in Jamaica and in Southern India, is one of the most distinct evergreen species contained in the genus. Although in its native habitats its fronds are said to attain 2ft. in length and 8in. in breadth, it is very seldom indeed, under cultivation, that they exceed 1¼ft. in height ; they are borne on tufted stalks 3in. to 6in. long, densely clothed with narrow scales, and pinnate nearly to the base. The disposition of the leaflets is most peculiar : the first eight or ten pairs, in the lower part of the frond, are reduced in size, measuring only about ½in. in length ; whereas the others, which are bluntly lobed, are 2in. to 4in. long, about 1in. broad, and cut two-thirds of the way down into close, entire lobes of a leathery texture, and nearly naked on their under-side. The very prominent veinlets are disposed eight to ten on each side, and the sori (spore masses) are situated nearer the edge than the midrib and covered with an involucre of a very fugacious nature.—*Hooker*, *Species Filicum*, iv., p. 103.

N. (Eunephrodium) denticulatum—Eu-neph-ro′-dĭ-um ; den-tic-ul-a′-tum (having small teeth), *Hooker.*

A stove species, of medium dimensions, whose habitat extends from the West Indies and Guatemala to South Brazil. Its triangular fronds, 1ft. to

2ft. long and 8in. to 12in. broad, are borne on tufted stalks, which are 1ft. or more in length, densely clothed with narrow scales at the base and naked above. The lower leaflets are much the largest, and the lowest pinnules (leafits), larger than the others, are spear-shaped with their segments again pinnate, being cut into spathulate (spoon-shaped) lobes furnished with spiny teeth. The texture is leathery, and the abundant sori (spore masses) are scattered over the whole under-surface.—*Hooker*, *Species Filicum*, iv., p. 147.

N. (Lastrea) deparioides—Las′-tre-a ; dep-ar-ĭ-ŏ-i′-des (Deparia-like), *Hooker.*

This greenhouse species, of medium size, native of Ceylon and Southern India, where, according to Beddome, it is found on the Anamallay Hills, though not in abundance, possesses a character unique in the genus through the position of its sori (spore masses), which are quite terminal, thus giving the plant the appearance of a Deparia. Its oblong-spear-shaped fronds, 1½ft. to 2ft. long and 8in. to 10in. broad, are borne on firm stalks 1ft. or more long and slightly scaly below. The lower leaflets, 4in. to 6in. long, 2in. broad, and spear-shaped, are cut down to the rachis (stalk of the leafy portion) into unequal-sided, stalked, triangular pinnules (leafits), whose broad, blunt, nearly quadrangular lobes are furnished with very distinct and prominent teeth. The texture is soft and papery, and the sori (spore masses), terminal in the teeth, are quite concealed by convex involucres.—*Hooker*, *Species Filicum*, iv., p. 139 ; *Filices Exoticæ*, t. 3. *Beddome*, *Ferns of Southern India*, t. 104.

N. (Lastrea) dilatatum—Las′-tre-a ; di-la-ta′-tum (enlarged), *Desvaux.*

Although given in the "Synopsis Filicum" as simply a variety of *N. spinulosum*, also of Desvaux, this strong-growing, perfectly hardy Fern, popularly known in England as the "Broad, Prickly-toothed Buckler Fern," possesses such distinctive characters, and has been accepted in commerce as a species for such an indefinite space of time, that we cannot deprive it of its specific rank, which has been acknowledged by such authorities as Smith and Swartz under the generic appellation of *Aspidium*, and by Babington, Lindley, Moore, Presl, Sowerby, and others under that of *Lastrea*. With the object of making it perfectly clear for future reference, it is perhaps well

to point out the marked differences existing in the two plants under the respective names which, for once differing from the authors of "Synopsis Filicum," we intend retaining in this work.

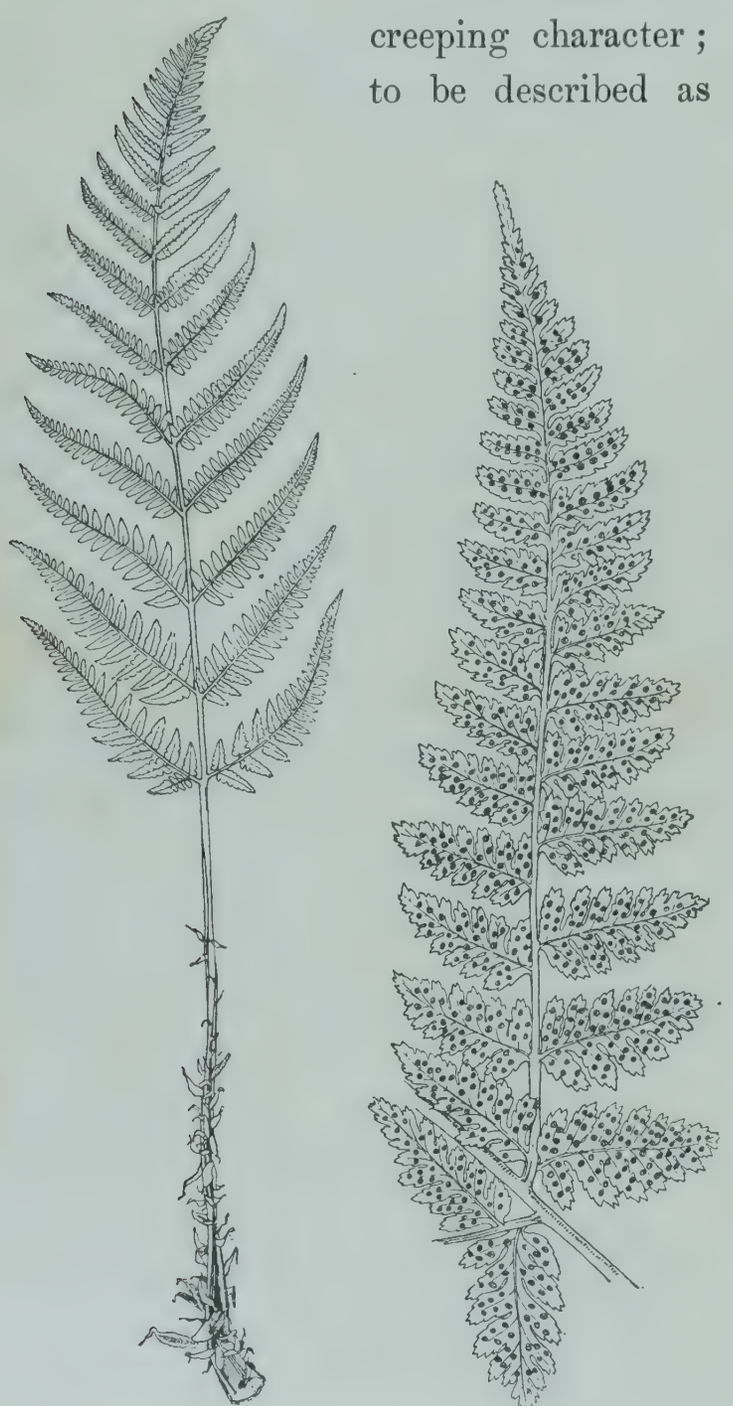


Fig. 120. Frond and Fertile Pinna of Nephrodium dilatatum
(Frond, much reduced; Pinna, ½ nat. size).

The caudex or rootstock of *N. dilatatum* is not of a creeping character; it is large, erect, and almost entitled to be described as arborescent, for miniature stems or trunks 1ft. to 1¼ft. high are frequently met with in a wild state. The rootstock of *N. spinulosum*, on the contrary, is of a decidedly creeping nature; and, although spreading slowly, yet in old plants it reaches to a certain distance and sends up numerous crowns or tufts of fronds. In *N. dilatatum* the crown is usually solitary, though sometimes two or three may be found growing so close together as to form one solid mass; when fully developed this is of the size of a man's fist and densely covered with large scales of a bright, dark brown colour, almost triangular and of a deciduous nature, and the fronds produced from the same are disposed in a symmetrical, circular cluster bearing some resemblance to the capital of a Corinthian column. The fronds are more decompound (finely divided) than those of *N. spinulosum*, which are produced from small, whitish crowns and disposed in irregular tufts. In habit and colour they are also different, for, while in *N. dilatatum* the entire fronds, which frequently attain 6ft. in length and 1½ft. in breadth, are either upright or spreading and of a dark green

Pellæa atropurpurea

(½ nat. size)

colour above and paler beneath, those of *N. spinulosum*, seldom more than 1½ft. long and 8in. broad, are of a delicate light green colour on both sides and perfectly flat. Further, in *N. dilatatum* the pinnules (leafits) and their sub-divisions are usually more or less twisted or contorted.

From the above comparisons it will at once be seen that great outward differences exist between the two plants, which, we contend, should remain totally distinct, especially when we take into consideration the fact that *N. dilatatum* is an extremely variable Fern, differing in form and stature according to the situation in which it grows. Thus, when found in a spot which is wet in the spring and dried up in the summer, as on the margin of a pond, its fronds are large, quite drooping, and of a peculiar dark colour. A dry and rocky or a confined situation renders the fronds smaller and less divided, their pinnules (leafits) being then blunt, deflexed, or drooping; whereas permanent wet will elongate the fronds and separate the leaflets and also their divisions. The fructification is abundant, the sori (spore masses) being situated nearer the midvein than the edge (Fig. 120); at first they are swollen and kidney-shaped, but the indusium (covering), when bursting, becomes circular, with a deep cut or depression in its lower side.—*Lowe*, *Our Native Ferns*, i., t. 32; *Ferns British and Exotic*, vi., t. 27. *Correvon*, *Les Fougères Rustiques*, p. 140.

N. dilatatum is not only distributed over all parts of Europe (where its existence is recorded from Lapland to Portugal and Spain), but it is dispersed through the whole world: thus, it is found in Asia, in Kamtschatka; in Africa, in the Azores; in America, in Canada and on the Rocky Mountains; whereas in England it is so common that no locality need be specified. On account of its decorative qualities as well as for its hardihood, it must be acknowledged as one of the most valuable Ferns known for the adornment of the rockery or the shrubbery, as it grows very well upon elevated positions and in exposed situations, although it will attain greater size and beauty when accorded a shady spot than when grown in full exposure to light. It is, therefore, well adapted for the shaded side or base of the rockery, and as it will, when once established in a favourable position, attain large dimensions, forethought will be required in planting, so that it may not smother the smaller-growing species. If grown as a pot-plant, *N. dilatatum* must be allowed a moderate space for its roots, and it prefers a compost of fibrous

loam, peat, and sand, in about equal proportions. When sheltered, it retains its fronds through the winter. It may be freely increased by means of its spores, which ripen about September and germinate very freely.

The varieties of *N. dilatatum* found growing spontaneously or produced by cultivation are very numerous. Moore, in his "Nature-printed Ferns," describes eighteen of them as most distinct, and in a list published in 1865, Mr. P. Neill Fraser, of Canonmills Lodge, Edinburgh, enumerates no less than sixty-five varieties. E. J. Lowe, in his excellent work, "Our Native Ferns," while describing sixty varieties, illustrates no less than forty-three of them. The following are the most distinct of those at present known, many of those included in the above-named lists having disappeared from cultivation :

N. d. angustipinnulum—an-gus-tip-in′-nul-um (having narrow leafits), *Moore*.

A singular form, originally found in Lancashire. Its curious fronds, about 1ft. long and bipinnate (twice divided to the midrib), are to a certain extent depauperated (impoverished), their pinnules (leafits) being rather distant and narrow, about 1in. long, and unequally toothed on their margins, while near the extremity of the fronds they are shortened into irregular, roundish lobes.—*Lowe, Our Native Ferns*, i., fig. 259.

N. d. Chanteriæ—Chan-te′-rĭ-æ (Mrs. Chanter's), *Moore*.

A beautiful and very distinct variety, originally found in tolerable abundance at Hartland, in North Devon. Its handsome fronds, 2ft. long, are oblong-spear-shaped, abruptly narrowing at the base, and narrowing into a long tail-like process at their summit. The leaflets, 3½in. long, 1½in. broad, and twisted upwards, have their basal pinnules (leafits) oblong and very blunt at the extremity. The small and numerous sori (spore masses) are disposed in a single line on either side near the midrib of the small pinnules and on the lobes of the larger ones.—*Lowe, Our Native Ferns*, i., fig. 245.

N. d. collinum—col-li′-num (hill-loving), *Newman*.

This variety, usually known as "Pinder's Hill Prickly-toothed Buckler Fern," has its leaflets situated distant from one another and particularly spreading.—*Lowe, Ferns British and Exotic*, vi., p. 79.

N. d. compactum—com-pac′-tum (compact), *Sim.*

A very distinct variety, of small dimensions, raised from spores at Mr. R. Sim's Nursery, at Foot's Cray, Kent. The fronds, 4in. to 8in. long and borne on short stalks, are short-triangular, thick in texture, and of a very leafy nature. The broad and closely-set leaflets are blunt at their extremity, and their overlapping pinnules (leafits) are somewhat variable in outline.—*Lowe, Our Native Ferns*, i., fig. 257.

N. d. crispum—cris′-pum (curled), *Moore.*

A thick-textured variety, with fronds of normal size and shape, but differing from those of the species through the conspicuously curled or crisped nature of the pinnules (leafits), which are of a very dark green colour. It was originally found in the neighbourhood of Nettlecombe.—*Lowe, Our Native Ferns*, i., fig. 244.

N. d. cristatum—cris-ta′-tum (crested), *Moore.*

This pretty and distinct variety, originally found near Doncaster and subsequently in Devonshire, differs from the species solely by its broader and somewhat shorter fronds having their extremity, as also that of their leaflets, usually twice-forked and forming blunt, flat, spreading crests. The leaflets are not all regularly crested, but where not so they are enlarged, showing a tendency to forking.—*Lowe, Our Native Ferns*, i., fig. 237.

N. d. dumetorum—du-me-to′-rum (thicket-bush-like), *Moore.*

A dwarf variety, whose fronds, seldom exceeding 10in. in length, have a pleasing, crisped appearance, owing to the upper surface of their leaflets being of a pinched and puckered nature, quite distinct from all other known varieties. The very abundant, large, and distinct sori (spore masses) are covered with indusia conspicuously fringed and provided with stalked glands. This form has been found in Silverthwaite, Westmoreland; at Challacombe, in Devonshire; at Ingleborough, in Yorkshire; in Argyleshire, Aberdeenshire, and Ross-shire, in Scotland; also in Ireland and in the Isle of Man.—*Lowe, Our Native Ferns*, i., fig. 231.

N. d. gracile—grac′-il-ĕ (slender), *Lowe.*

This lax, slender form, of Hemlock-like appearance when growing vigorously, was originally found in the Island of Arran. Its fronds, borne

on stalks about 1ft. long and densely scaly, are about 1ft. long and 9in. broad in the middle. Their leaflets are distant, and the pinnules (leafits), sometimes opposite, sometimes alternate, are long, narrow, and more or less rounded at the extremity, where they are sometimes forked.—*Lowe*, *Our Native Ferns*, i., fig. 263.

N. d. grandiceps—gran′-dic-eps (large-headed), *Moore*.

A remarkable variety, originally found at Windermere, and probably the most beautifully-crested known form of *N. dilatatum*. Its handsome fronds, of normal size, show a great development of the crests, which are disposed with constant regularity and symmetry at the end of each leaflet, besides a very large one at the extremity of the frond itself (Fig. 121).

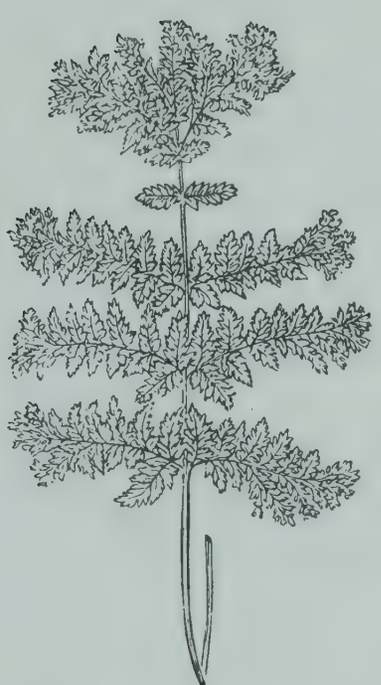


Fig. 121. Frond of Nephrodium dilatatum grandiceps (much reduced).

N. d. Howardii — How-ar′-dĭ-i (Howard's), *Monkman*.

This unique variety is the most remarkable form of *N. dilatatum* that has yet been discovered. The name *Howardii*, according to Lowe, was given in compliment to the Earl of Carlisle, and in acknowledgment of the interest his Lordship has taken in the Ferns of the Castle Howard district. It was found accidentally by one of Lord Carlisle's labourers, growing luxuriantly in the Raywood, closely contiguous to Castle Howard. Like the original species, this variety is of robust habit, but the outlines of the fronds present a peculiar contracted appearance towards their extremity, where the leaflets, becoming curiously dwarfed and transformed, are composed of pinnules (leafits) having three, four, or five short divisions which are finely and continuously toothed on the margins. On account of this arrangement, the leaflets, with their transformed forked pinnules, strongly resemble the small fronds of the better-known *Asplenium* (*Athyrium*) *Filix-fœmina Fieldiæ* and *Aspidium* (*Polystichum*) *angulare Elworthii*.—*Lowe*, *Our Native Ferns*, i., figs. 241, 242, 243.

N. d. lepidotum—lep-id-o′-tum (scaly), *Moore*.

A singularly distinct, dwarf variety, with a very obscure history. It is said to have been originally found in Yorkshire, but all that we know respecting it is that it was distributed by Mr. Tait, of Edinburgh. Its remarkably handsome fronds, scaly in all their parts, are quadripinnate (four times divided to the midrib), and in full-grown specimens measure 1½ft. in length ; they are broadly egg-shaped, and the leaflets are everywhere very unequal, the posterior ones being much the larger. The small and distinct pinnules (leafits) are again divided into distant, blunt segments, having a tapering, stalk-like base. A striking peculiarity in the development of the fronds of this variety, as observed by Thomas Moore, consists in the indefinite character of their evolution, for the basal pinnules of a leaflet have matured and scattered their spores before the extremity of the same leaflet has expanded. This extraordinary form reproduces itself true from spores. —*Lowe, Our Native Ferns*, i., t. 33.

N. d. nanum—na′-num (dwarf), *Newman*.

This, the smallest variety of *N. dilatatum* known in commerce, was originally found near Settle, in Yorkshire, and eventually in the hilly districts of Scotland, Ireland, and Wales. Its fronds, which seldom, if ever, exceed 10in. in length, are egg-shaped, broadest at the base, and bipinnate (twice divided to the midrib). The spreading leaflets have their basal pinnules (leafits) stalked, and the larger ones deeply lobed, with finely-toothed edges. The sori (spore masses), which usually cover the whole under-side of the frond, are often most copious towards its summit, forming a line on either side.—*Lowe, Our Native Ferns*, i., p. 317.

N. d. ramosum—ra-mo′-sum (branched), *Moore*.

A fine and really interesting Fern, said to be a native of Scotland. It has the appearance of being a ramose form of *N. d. dumetorum ;* it is usually twin-fronded, but sometimes each twin frond is again divided, thus forming a large, flabellate (fan-shaped) mass of foliage, and in that state it is very remarkable. The spores are abundant, and more or less reproduce the variety, some seedlings being more branched than others.—*Lowe, Our Native Ferns*, i., fig. 238.

N. d. Stansfieldii—Stans-field′-ĭ-i (Stansfield's), *Moore.*

This remarkably pretty form, of dwarf dimensions, was originally found in Cheshire. Its fronds, 8in. to 10in. long and 4in. to 5in. broad, are somewhat triangular in shape, and furnished with strap-shaped, blunt leaflets and leafits of a totally distinct character, being conspicuously crisped or recurved, of a thick, leathery texture, and so abundantly glandular as to give almost a horny appearance to the frond.—*Lowe*, *Our Native Ferns*, i., fig. 269.

N. d. tanacetifolium—tan-ac-e′-tif-ol′-ĭ-um (Tansy-leaved), *Moore.*

This common yet very pretty variety, found in Devonshire, Kent, Surrey, Derbyshire, Yorkshire, and other parts of England, is, or at least formerly was, abundant in various places between Clitheroe and Preston, and Clitheroe and Lancaster. Its large, broadly-triangular fronds are tripinnate (three times divided to the midrib). The robust stalks are abundantly furnished with entire, spear-shaped scales of a dark brown colour, and marked with a darker bar down their centre.—*Lowe*, *Our Native Ferns*, i., p. 293 ; *Ferns British and Exotic*, vi., p. 79.

Fig. 122. Nephrodium dissectum (much reduced).

N. (Lastrea) diplazioides—Las′-tre-a ; dip-laz-ĭ-ŏ-i′-des (Diplazium-like), *Hooker.*

A greenhouse species, of robust habit, native of Columbia, producing fronds 2ft. to 3ft. long, sometimes 1ft. broad, and borne on tufted stalks 6in. or more long, densely clothed with narrow scales of a dark brown colour. The leaflets, of a soft, papery texture, and furnished with a gland at the base beneath, are 4in. to 6in. long, 1in. to 1½in. broad, and cut down to a broadly-winged stalk into nearly entire, broad lobes, reaching less than half-way down to the midrib, close to which the sori (spore masses), covered by a small, spiny involucre, are disposed.—*Hooker*, *Species Filicum*, iv., p. 99.

N. (Lastrea) dissectum—Las′-tre-a ; dis-sec′-tum (dissected), *Desvaux.*

This very handsome, strong-growing, stove species, which is better known as *N. membranifolium*, is a widely-spread plant, being found in New Caledonia, Ceylon, Madagascar, and the Philippine Islands, and also, according to Beddome, on the Anamallays and Neilgherries, in the Sisparah and Carcoor Ghats. Its ample fronds, in shape of the Greek delta, Δ, and borne on rather slender stalks 1ft. or more long, clothed towards the base with narrow scales of a dark brown colour, are from 1ft. to 5ft. long and 1ft. to 3ft. broad. The

Fig. 123. Lower Leaflet of Nephrodium dissectum
(⅛ nat. size).

lower leaflets, which sometimes are simply pinnatifid (cut half-way down to the midrib), with broad, blunt lobes (Fig. 122), and sometimes 1ft. long and pinnate (Fig. 123, reduced from Col. Beddome's "Ferns of Southern India," by the kind permission of the author), with similarly pinnatifid pinnules (leafits), are of a soft, papery texture and of a bright green colour. The sori (spore masses), copious and generally disposed at a little distance from the edge of the pinnules, are covered by a flat involucre.—*Hooker, Species Filicum*, iv., p. 131. *Nicholson, Dictionary of Gardening*, ii., p. 440.

N. (Eunephrodium) distans—Eu-neph-ro′-dĭ-um ; dis′-tans (distant), *Hooker*.

A stove species, of medium dimensions, native of Madagascar. Its fronds, produced from a strong, wide-creeping rhizome (prostrate stem), and borne on firm, erect stalks 1ft. or more long, of a brownish colour, and slightly hairy, are 1½ft. to 2ft. long, 8in. to 10in. broad, and furnished with leaflets 3in. to 4in. long, slightly lobed, and of a soft, papery texture. The spore masses are disposed in contiguous rows, filling up nearly the whole space between the midrib and the edge.—*Hooker*, *Species Filicum*, iv., p. 76.

N. (Lastrea) Eatoni—Las′-tre-a ; Eat′-on-i (Eaton's), *Baker*.

A greenhouse species, of medium size, native of the Kakeah and Loo-Choo Islands, Eastern Asia. In habit as well as in cutting it resembles *N. dilatatum*, from which it differs in its dense, fine, spreading, hair-like scales and in the slightly hairy nature of its rachises (stalks of the leafy portion) and of the under-surface of its fronds, which are 1ft. to 1½ft. long, 6in. to 9in. broad, and of a soft, papery texture. The small and copious sori (spore masses) are covered by a glandularly-ciliated involucre.—*Hooker*, *Synopsis Filicum*, p. 276.

N. (Lastrea) effusum—Las′-tre-a ; ef-fu′-sum (spreading), *Baker*.

This very handsome, stove species, usually known in commerce under the names of *Polypodium effusum* and *P. divergens*, is a native of Cuba, Mexico, Brazil, and Peru. Its beautifully decompound (much-divided) fronds, produced from a short-creeping, woody rhizome (prostrate stem), and borne on stalks 2ft. long or more and slightly scaly below, attain fully 4ft. in length by 2ft. in breadth, and are four or five times pinnatifid (cut partly to the midrib). The lower leaflets, which are the longest, measure 1ft. to 1½ft. in length and are often 1ft. broad ; they are furnished with closely-set, spear-shaped pinnules (leafits), divided again into spear-shaped, unequal-sided segments, the lower ones of which are cut down to the midrib into oblong, pinnatifid, bluntish lobes. The fronds are of a somewhat leathery texture and of a pale green colour on both sides ; and the copious sori (spore masses), scattered over their under-surface, are generally devoid of involucre. —*Hooker*, *Species Filicum*, iv., p. 265.

N. (Eunephrodium) elatum—Eu-neph-ro′-dĭ-um ; e-la′-tum (tall), *Baker.*

A stove species, of large dimensions, native of the Mauritius, and readily distinguished by its oblong-spear-shaped fronds, 3ft. to 4ft. long and 1½ft. to 2ft. broad, produced from a wide-creeping rhizome and borne on grey, downy stalks about 1ft. long. They are of a moderately firm texture, dark green on both surfaces, and densely downy on the ribs and edges.—*Hooker*, *Synopsis Filicum*, p. 502.

N. (Lastrea) elongatum — Las′-tre-a ; e-lon-ga′-tum (elongated). A variety of *N. Filix-mas.*

N. (Lastrea) Elwesii—Las′-tre-a ; El-wes′-ĭ-i (Elwes's), *Baker.*

A greenhouse species, of medium dimensions, native of Sikkim, in general habit much resembling *N. concinnum.* Its oblong-spear-shaped fronds, however, are borne on very short, slightly downy stalks ; they are of moderately firm texture and bright green and smooth on both surfaces. The small sori (spore masses), disposed on the margins of the leaflets, are covered with tiny, smooth involucres of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 497.

N. (Lastrea) eriocarpum—Las′-tre-a ; er-ĭ-oc-ar′-pum (woolly-fruited). Synonymous with *N. odoratum.*

N. (Lastrea) eriocaulon — Las′-tre-a ; er-ĭ-oc-au′-lon (woolly-stemmed), *Baker.*

The distinctive character of this stove species, native of Rio Janeiro, resides in the woolly nature of the stalks of its fronds, which are densely clothed with narrow, spreading scales of a rusty-brown colour. Its fronds, oblong-spear-shaped and bipinnatifid (twice divided half-way to the midrib), are 2ft. to 3ft. long, of a parchment-like texture, bright green on both surfaces, and slightly downy underneath. The medium-sized sori (spore masses) are disposed on the veins, and are covered with small, fugacious involucres.—*Hooker*, *Synopsis Filicum*, p. 495.

N. (Lastrea) erythrosorum—Las′-tre-a ; er-yth-ros-o′-rum (having red sori), *Hooker.*

This greenhouse species, of medium dimensions, native of Japan and China, produces from a thick, underground-creeping stem, broadly spear-shaped

fronds 1ft. to 1½ft. long and 8in. to 12in. broad, borne on stalks 6in. to 9in. long and more or less densely clothed with narrow scales of a dark brown or blackish colour. The leaflets are spear-shaped, and the lowest, which are also the largest, frequently measure 6in. long and 1½in. broad; they are cut down to the rachis (stalk) below into oblong, bluntish pinnules (leafits) 2in. to 3in. broad and with slightly-toothed edges. The texture, though of a papery nature, is firm, and both surfaces are naked. The sori (spore masses) are disposed near the midrib, six to nine to a pinnule, and are covered by flat involucres of a bright red hue when young.—*Hooker*, *Species Filicum*, iv., p. 120, t. 253. *Nicholson*, *Dictionary of Gardening*, ii., p. 440.

N. erythrosorum, or, as it is most popularly called, *Lastrea erythrosora*, is a highly decorative species (see Coloured Plate), in many respects distinct from all other members of the genus, and a valuable addition to the list of Ferns possessing characters sufficiently attractive to deserve cultivation on a large scale. It has proved perfectly hardy under our London climate, having stood, without any protection whatever, the test of our hardest winters; but under such treatment it becomes deciduous. When treated as a cool indoor subject, its magnificent fronds, of a beautiful bronzy hue in a young state, but turning with age to a dark shining green, remain on the plant all the year round, and make it a very useful species for winter decoration. The whole plant is rendered exceedingly attractive by the bright red indusia, which contrast pleasantly with the dark glossy green of the upper surface of the frond. *N. erythrosorum* is easily propagated from spores.

N. (Eunephrodium) eusorum—Eu-neph-ro′-dĭ-um; eu-so′-rum (having prominent sori). Synonymous with *N. truncatum*.

N. (Pleocnemia) excellens — Plĕ-oc-ne′-mĭ-a; ex-cel′-lens (excellent), *Blume*.

A stove species, of large dimensions, native of Java, with ample fronds bipinnatifid (twice divided to the midrib) and borne on stout, naked stalks of a greyish colour. The lower leaflets, 1ft. long and 3in. to 4in. broad, are cut down nearly to the rachis (stalk of the leafy portion) into entire, spear-shaped lobes of a somewhat leathery texture. The small and copious sori (spore masses) are disposed principally in two irregular rows near the midrib of the lobes.—*Hooker*, *Species Filicum*, iv., p. 63.

N. (Eunephrodium) extensum — Eu-neph-ro′-dĭ-um ; ex-ten′-sum (stretched out), *Hooker.*

A very massive-looking, greenhouse species, native of Ceylon and Southern India, where, according to Beddome, it is found on the Neilgherries, the Anamallays, and other mountainous tracts. Its large and copiously-pinnate fronds, 2ft. to 4ft. long, 1ft. to 1½ft. broad, and borne on robust stalks 1ft. to 2ft. long, slightly hairy, and of a brownish colour, are produced from a wide-creeping rhizome (prostrate stem) of a fleshy nature. The leaflets, which are numerous and closely set, are disposed almost horizontally ; they are of a soft, papery texture, 6in. to 9in. long, and cut about two-thirds of the way down to the midrib into narrow-oblong lobes, the under-surface of which is naked or slightly hairy. The sori (spore masses) are disposed in rows, nearly terminal on the veins, and not confined to the lobes. The whole plant is of a pleasing bright green colour.—*Hooker, Species Filicum*, iv., p. 72, t. 240A. *Nicholson, Dictionary of Gardening*, ii., p. 440.

N. (Lastrea) Fairbankii — Las′-tre-a ; Fair-bank′-ĭ-i (Fairbank's). Synonymous with *N. Thelypteris.*

N. (Lastrea) Falconeri—Las′-tre-a ; Fal-con-e′-ri (Falconer's), *Hooker.*

This well-marked, greenhouse species, native of Cashmere, has the outward appearance of *N. fragrans* on a large scale. Its oblong-spear-shaped fronds, 1½ft. to 2ft. long and 8in. to 10in. broad, are produced from an upright crown and borne on stalks 1ft. long, densely clothed throughout with somewhat egg-shaped scales. The leaflets, 4in. to 5in. long and ½in. to 2in. broad, have their largest pinnules (leafits) cut down nearly to the rachis into oblong, blunt lobes, with edges revolute (turned back). The sori (spore masses) are disposed in rows and situated close to the midrib of the pinnules. —*Hooker, Species Filicum*, iv., p. 123, t. 254. *Beddome, Ferns of British India*, t. 41.

N. (Eunephrodium) Fendleri — Eu-neph-ro′-dĭ-um ; Fend′-ler-i (Fendler's), *Hooker.*

A stove species, of medium size, native of Venezuela, with fronds 2ft. to 3ft. long, 1ft. or more broad, borne on greyish, naked stalks 1ft. to

2ft. long. The leaflets, of a leathery texture and naked on both surfaces, are cut about a third of the way down to the rachis (stalk of the leafy portion) into oblong, blunt lobes, on the margins of which the sori (spore masses), covered by a firm, persistent involucre, are regularlv disposed.—*Hooker*, *Species Filicum*, iv., p. 82.

N. (Eunephrodium) ferox—Eu-neph-ro′-dĭ-um ; fer′-ox (fierce), *Moore.*

This handsome, stove species, native of Kumaon, Java, and the Philippine Islands, is of peculiarly robust habit, and, when planted out, attains large dimensions. Its ample, pinnate (once-divided) fronds, which attain 4ft. in length and 2ft. or more in breadth, are produced from an upright crown, and are borne on strong stalks 1ft. to 2ft. long, densely covered with long, narrow, black scales. The numerous and closely-set leaflets are of a somewhat leathery texture and glossy on both surfaces ; they are cut about one-third of the way down into spear-shaped lobes. The large and conspicuous sori (spore masses) are solitary on, or close to, each main vein.—*Hooker*, *Species Filicum*, iv., p. 77. *Beddome*, *Ferns of British India*, t. 129.

N. (Lastrea) ferrugineum—Las′-tre-a ; fer-ru-gin′-ĕ-um (rusty-coloured), *Baker.*

A beautiful, stove species, from Southern India, where, according to Beddome, it is found on the Neilgherries, in Sholas on the Koondahs, on the road between Avalanche and Sisparah. Its massive yet elegant fronds, somewhat triangular in shape and soft in texture, sometimes attain 2ft. in length and 1½ft. in breadth, and are tripinnate (three times divided to the midrib). The leaflets spread at a right angle, the lowest being 6in. to 9in. long and 3in. to 5in. broad. The pinnules (leafits) of the under-side are the largest, spear-shaped, bluntish, closely set, and divided again into broad, egg-shaped segments, with close, nearly entire lobes toothed on the margins. The stout stalks, 1ft. to 1½ft. long, as well as the rachises (stalks of the leafy portion) are densely clothed, especially on their upper part, with spreading, broad scales of a reddish-brown colour. The large and conspicuous sori (spore masses) are disposed two or three to a lobe, to the upper half of which they are confined.—*Hooker*, *Synopsis Filicum*, p. 283. *Beddome*, *Ferns of Southern India*, t. 100.

N. (Lastrea) Filix-mas—Las'-tre-a ; Fil'-ix-mas (Male Fern), *Richard.*

The "Male Fern," or, as it is also sometimes called, the "Common Buckler Fern," botanically known as *Nephrodium Filix-mas* of Richard, Hooker, and R. T. Lowe, *Lastrea Filix-mas* of Presl, Babington, Moore, Sowerby, and others, *Aspidium Filix-mas* of Swartz, Mettenius, Fée, E. J. Lowe, and others, *Polypodium Filix-mas* of Linnæus, Bolton, and Hudson, and *Polystichum Filix-mas* of De Candolle, Roth, Koch, and Ledebour, is, of all our native Ferns, the one which occurs in most districts. According to Lowe, "it is equally common in all the counties of England, Scotland, Wales, and Ireland, the Channel Islands, the Northern Islands, and Western Islands, ascending the hills in Scotland to the elevation of 1500ft." Its habitat, however, is not limited to the British Islands, for it is of most cosmopolitan character, being found throughout Europe, on the Continent of which, Correvon states in his "Fougères Rustiques" (p. 133), it is one of the commonest of all Ferns. It occurs in Asia, from Lapland to Japan and the Malayan Islands, ascending the Himalayas to 1500ft. ; it is also found in some form or other in Africa, Algeria, Madeira, and the Azores ; while we have it on the authority of Eaton that in America it is common from Greenland along the Rocky Mountains and Andes to Peru, as well as in Canada, Colorado, &c.

The handsome fronds of this species are broadest in the middle, narrowing towards the base, and to a sharp point at their summit ; they are produced from a large, somewhat upright stem of a woody nature, covered with thick, brown, overlapping scales, which also extend to the strong stalks. They are 2ft. to 3ft. long and 8in. to 12in. broad, and are furnished with spear-shaped leaflets 4in. to 6in. long, about 1in. broad, cut down very nearly to the rachis (stalk of the leafy portion) into close, blunt, regular, nearly entire lobes of a papery texture, the lower ones rather shorter than the others. The abundant and large sori (spore masses) are covered with a large, convex indusium.—*Hooker, British Ferns*, t. 15. *Nicholson, Dictionary of Gardening*, ii., p. 440. *Lowe, Our Native Ferns*, i., t. 26. *Eaton, Ferns of North America*, i., t. 41. *Correvon, Les Fougères Rustiques*, p. 133.

The Male Fern is of an extremely variable character—so much so that, besides the almost endless varieties that are known to exist and most of which have been found growing spontaneously, Mr. G. B. Wollaston, of

Chislehurst, Kent, an authority who has exercised great care in the examination of this Fern, recognises three distinct species which he names *Lastrea Filix-mas*, *L. pseudo-mas*, and *L. propinqua*. Mr. E. J. Lowe, who has also devoted a great deal of his time to researches on the subject, follows, in his excellent work, "Our Native Ferns" (vol. i., p. 233), Mr. Wollaston's theory and adopts his views. Such well-known authorities as Hooker, Babington, and Moore, however, have deemed it more prudent to consider the above-named plants as simply varieties connected by numerous forms, all of which, in commerce as well as in botanic gardens, are to this day known as varieties of *Filix-mas*. On account of its hardihood and of its easy culture, the Male Fern may be considered one of the very best either for town or for country treatment, as it bears smoke better than any other British Fern. In its natural state it is, according to Lowe, "found lining the sides of ditches, the margins of rivers and lakes, the edges of cliffs and crevices of rocks, be they moist or dry, no matter what their geological construction, becoming a principal undergrowth in many woods, and even growing where the salt waves of the sea can occasionally wash over them" ("Our Native Ferns," vol. i., p. 42).

N. Filix-mas is a Fern of noble habit, and when planted in naturally sheltered places, it becomes almost an evergreen species, most useful for ornamenting the rockery and shrubbery. Like many other Ferns, it looks much handsomer when planted out, especially if disposed upon an irregular surface, in clumps of six or eight strong plants each, with a few pieces of stone or rock, which greatly add to their appearance, laid in between and among them. A most striking illustration of the above arrangement is in existence at Ashurst Park, the seat of Mr. G. Field, near Tunbridge Wells, where British Ferns (species and varieties) are grown to perfection in a most natural way. The Male Fern is not, however, in any way fastidious, and will grow luxuriantly either in pots or planted out, in almost any soil, provided that during its growing season it receive a good supply of water at the roots; but it prefers a light and sandy loam to a stiff clay, and although it will bear exposure to the sun, yet it flourishes much better in a shady situation. It is readily propagated from spores, which are usually ripe about Midsummer, and also from division of the crowns, which is a much slower process.

Variations from the type are very numerous, some which have been raised artificially from spores, and others which have been found growing spontaneously, being exceedingly handsome and of a permanent character. Many of these are described and illustrated in Moore's "Nature-printed Ferns"; while in the list published in 1865 by Mr. P. Neill Fraser, of Canonmills Lodge, Edinburgh, upwards of a hundred varieties are enumerated. The following are the most distinct and interesting:

N. F.-m. abbreviatum — ab-brev-ĭ-a′-tum (shortened), *Babington and Moore.*

This peculiarly distinct form is the one which Wollaston gives as a species under the name of *Lastrea pseudo-mas.* It is common along the banks of the Tees, above High Force, an imposing waterfall about four miles above Middleton; and occasional plants occur along Widdicomb Moor and Cronkley Fell, becoming more abundant as one approaches Cauldron Snout from the Clints. It is also found on Snowdon and Ingleborough; in Lancashire, Westmoreland, Cumberland, Gloucestershire, Forfarshire, and at Killarney. This variety is distinguished from the ordinary *Filix-mas* by its tufted habit, for, whereas the typical species is usually found growing in single crowns, this form is found in clumps which may be readily divided into as many as twenty distinct plants. The nature of its foliage is also different, as its fronds, seldom more than 14in. long, have their leaflets conspicuously curled, thus differing strikingly from the uniformly flat leaflets of *Filix-mas;* whilst the usual solitary spore-case on each leaflet of the variety is equally a marked contrast to the six or eight spore-cases on each leaflet of the typical plant.—*Lowe, Our Native Ferns*, i., fig. 186.

N. F.-m. a. cristatum—cris-ta′-tum (crested), *Clowes.*

A sub-variety, of dwarf and compact habit, originally found in Borrodale, Cumberland. Its fronds, 1ft. to 1½ft. long, furnished with opposite leaflets and leafits and a very scaly midrib have their extremity, as well as that of their leaflets, which are comparatively narrow and loosely set, ornamented by a tassel formed by the midvein being once or twice forked.—*Lowe, Our Native Ferns*, i., t. 30; *New and Rare Ferns*, p. 69. *Nicholson, Dictionary of Gardening*, ii., p. 440.

N. F.-m. acrocladon—ac-roc′-lad-on (having branched ends), *Lowe.*

A beautiful variety, raised from spores by Mr. Clapham, of Scarborough. It is a distinct, handsome Fern, having, in general outline, a strong resemblance to *Aspidium* (*Polystichum*) *angulare.* Its fronds, about 2ft. long, are elegant in form and of a deep green colour; the deeply-cut leaflets have their extremities dilated into fan-shaped "fingers," these much-cleft tassels being largest on the basal leaflets, and becoming smaller towards the summit of the frond, which terminates somewhat abruptly.—*Lowe, Our Native Ferns*, i., t. 28; *New and Rare Ferns*, p. 127. *Nicholson, Dictionary of Gardening*, ii., p. 440.

N. F.-m. Barnesii—Bar-ne′-sĭ-i (Barnes's), *Moore.*

This particularly distinct and narrow-fronded variety was originally found near Milnthorpe, in Lancashire. Its fronds, 1¼ft. long, are of about equal breadth throughout, their leaflets being short, distant, somewhat triangular, seldom more than 1¼in. long, and divided into oblong pinnules (leafits) conspicuously toothed on the margins. The stalks and midribs are densely scaly. This variety reproduces itself freely from spores.—*Lowe, Our Native Ferns*, i., fig. 222.

N. F.-m. Bollandiæ—Bol-lan′-dĭ-æ (Mrs. Bolland's), *Moore.*

A strong-growing variety, which, on account of the great breadth of its fronds, their winged rachises (stalks of the leafy portion), and large, wavy pinnules (leafits), is very distinct. It was originally found in a hedgerow at Ashurst Park, Tunbridge Wells. The fronds, fully 1½ft. long, are broadly spear-shaped and twice divided to the base of the leaflets, the divisions of which are connected by the wings of the rachises.—*Lowe, Our Native Ferns*, i., fig. 188. *Nicholson, Dictionary of Gardening*, ii., p. 440.

N. F.-m. crispum—cris′-pum (curled), *Sim.*

This distinct variety, of small dimensions and compact habit, was originally found in Westmoreland, Cumberland, and Yorkshire. It is a densely-leafy Fern, with almost erect, short-stalked, dwarf, crispy, compressed, spear-shaped fronds, 8in. to 12in. long, 4in. to 6in. broad, and of a peculiar dark green colour. The pinnæ (leaflets) and their pinnules (leafits) overlap each other,

Gymnogramme decomposita, showing Habit and Portion of detached Frond

(Habit, $\frac{1}{6}$ nat. size; Portion of Frond, nat. size).

those next to the rachis (stalk) being so closely set as to frequently quite conceal it. This reproduces itself true from spores.—*Lowe, Our Native Ferns*, i., fig. 197. *Nicholson, Dictionary of Gardening*, ii., p. 440.

N. F.-m. cristatum—cris-ta′-tum (crested), *Moore.*

A truly beautiful variety, originally found at Charleston, near St. Austell, in Cornwall, and also near Ilfracombe, in Devonshire. It is of such a striking and decorative character that Lowe, in his excellent work, remarks that "it is the most ornamental and useful of British Ferns, that no Fernery can be complete without it, and that it is impossible to grow too many plants of it, a mass of *cristatum* being a picture to look upon." Its fronds, which are narrow-spear-shaped in outline and symmetrical in form, are of large size, being upwards of 3ft. in length and about 1ft. broad in the middle; their main and secondary stalks are densely covered with large scales of a light brown colour. They gracefully bend apparently from the weight of their very large, many times short-branched, and crispy terminal tuft or crest, the pinnæ (leaflets) ending in a similar though smaller, many-branched crest, thus fringing the outline of the frond, which is of a dark green colour, with a regular border of crispy and rather spreading crests. Whether grown in pots or planted out in the hardy Fernery, this variety produces a noble mass of fronds; it also possesses the advantage of reproducing itself true from spores, though seedlings have occasionally been found differing sufficiently from the parent to receive distinctive names.—*Lowe, Our Native Ferns*, i., t. 27. *Nicholson, Dictionary of Gardening*, ii., p. 440.

N. F.-m. c. angustatum—an-gus-ta′-tum (narrow), *Moore.*

This elegant variety, raised by Mr. R. Sim, of Foot's Cray, from spores of *cristatum*, bears very narrow fronds consisting of two almost parallel rows of crispy, compact tassels, diminishing in size as the fronds suddenly taper towards the large terminal crest, the weight of which imparts a gracefully-arching habit. The fronds are remarkably narrow, being 1ft. to 1½ft. in length and seldom more than 1½in. in breadth, and their stalks are densely covered with large, reddish-brown scales; they are simply pinnate (only once divided to the midrib), the leafits being all confluent and very narrow, so that the edges of the leaflets are merely slightly lobed, the whole frond

seeming, as Mr. Thomas Moore justly remarks, "to consist only of a frill on each side of the rachis." This variety is of a rich deep green colour and quite constant.—*Lowe, Our Native Ferns*, i., t. 31; *New and Rare Ferns*, p. 129.

N. F.-m. c. fimbriatum—fim-brĭ-a′-tum (fringed), *Birkenhead.*

A very handsome variety, raised from spores by Messrs. Birkenhead, of Sale, who describe it as a great improvement upon the old *cristatum*, being lighter in appearance, smaller, more compact, prettily crested, and fimbriated.

N. F.-m. dentatum—den-ta′-tum (toothed), *Lowe.*

This large-growing variety, originally found near Nettlecombe, is, in general appearance, somewhat like the coarser and laxer forms of *Aspidium* (*Polystichum*) *angulare.* Its fronds, 3ft. to 4ft. long and of a vivid green colour, are furnished with numerous sharp-pointed leaflets with deeply-cut and strongly-toothed pinnules (leafits).—*Lowe, Our Native Ferns*, i., fig. 204.

N. F.-m. elongatum—e-lon-ga′-tum (lengthened), *Hooker and Greville.*

A very distinct, strong-growing form, found in Madeira, the Azores, Cape Colony, Abyssinia, &c. Its fronds, sometimes 3ft. to 4ft. long and 2ft. broad, are quadripinnatifid (four times divided half-way to the midrib); the lower leaflets, 1ft. long and 4in. to 6in. broad, are divided into close, spear-shaped pinnules (leafits), cut down nearly to the rachis (stalk) into oblong, notched lobes.—*Hooker, Synopsis Filicum*, p. 272.

N. F.-m. foliosum—fol-ĭ-o′-sum (leafy), *Lowe.*

This remarkable Fern, originally found at Woodfield, Moseley, is of close, compact habit and medium dimensions. Its massive fronds, about 16in. long, are furnished with short and broad leaflets closely set together and overlapping each other from the base to the summit of the frond. The pinnules (leafits), large, rounded, and deeply cut almost to the midrib, have their margin more notched than toothed, the inferior ones being much longer, broader, and auricled (eared), almost concealing the midrib, which, like the stalk, is densely covered with large scales of a very dark brown colour.—*Lowe, Our Native Ferns*, i., fig. 209.

N. F.-m. furcans—fur′-cans (forked), *Moore.*

A strong-growing, handsome form, originally found at Windermere, but subsequently near Huddersfield, and on Bookham Common, Surrey. The fronds are of normal size and shape, except so far as the ends of the leaflets are concerned, the difference consisting in the forked character of the leaflets, the fish-tail-like terminations of which margin the fronds in a handsome manner. The frond itself is seldom forked at its summit.—*Lowe, Our Native Ferns*, i., fig. 192. *Nicholson, Dictionary of Gardening*, ii., p. 440.

N. F.-m. grandiceps—gran′-dic-eps (large-headed), *Wollaston.*

This, probably the most gigantic of the whole section of crested forms of *Filix-mas*, was originally found in Staffordshire. It grows to a size equal to that of the typical species, its fronds often measuring 2ft. in length by 6in. in breadth, but their extremity is densely crested and branched in a different way to other crested varieties, inasmuch as the process begins from a few inches from the summit of the frond (Fig. 124), where the rachis (stalk of the leafy portion) branches three or four times, each of the ramifications being furnished with closely-set leaflets, which are beautifully crested, as are also occasionally their pinnules (leafits), which in the lower part of the frond are elegantly pendulous.—*Lowe, Our Native Ferns*, i., fig. 225. *Nicholson, Dictionary of Gardening*, ii., p. 441.

Fig. 124. Frond of Nephrodium Filix-mas grandiceps (much reduced).

N. F.-m. Ingramii — In-gram′-ĭ-i (Ingram's), *Moore.*

A large variety, originally found in Worcestershire, and described by T. Moore, in the "Gardeners' Chronicle" of August 8th, 1863, as being one of the most striking varieties of *Filix-mas*, of normal development, which had come under his notice. Its fronds, 3ft. to 4ft. long and at least 1ft. broad, have a very distinct and remarkable appearance, which is produced by the

nature and the disposition of their pinnules (leafits), about 1in. long, ¼in. broad, and obliquely directed forwards. The upper part of the frond only is fertile, and differs from the lower portion through its pinnules being more pointed, more deeply cut, and smaller; the long, narrow outlines and obliquity of disposition being still preserved.—*Lowe*, *Our Native Ferns*, i., fig. 214.

N. F.-m. Jervisii—Jer-vis′-ĭ-i (Jervis'), *Moore*.

A somewhat coarse-growing variety, normal in size and habit, originally discovered near Darlaston Hall, Staffordshire, by Mr. Swynfen Jervis. Its

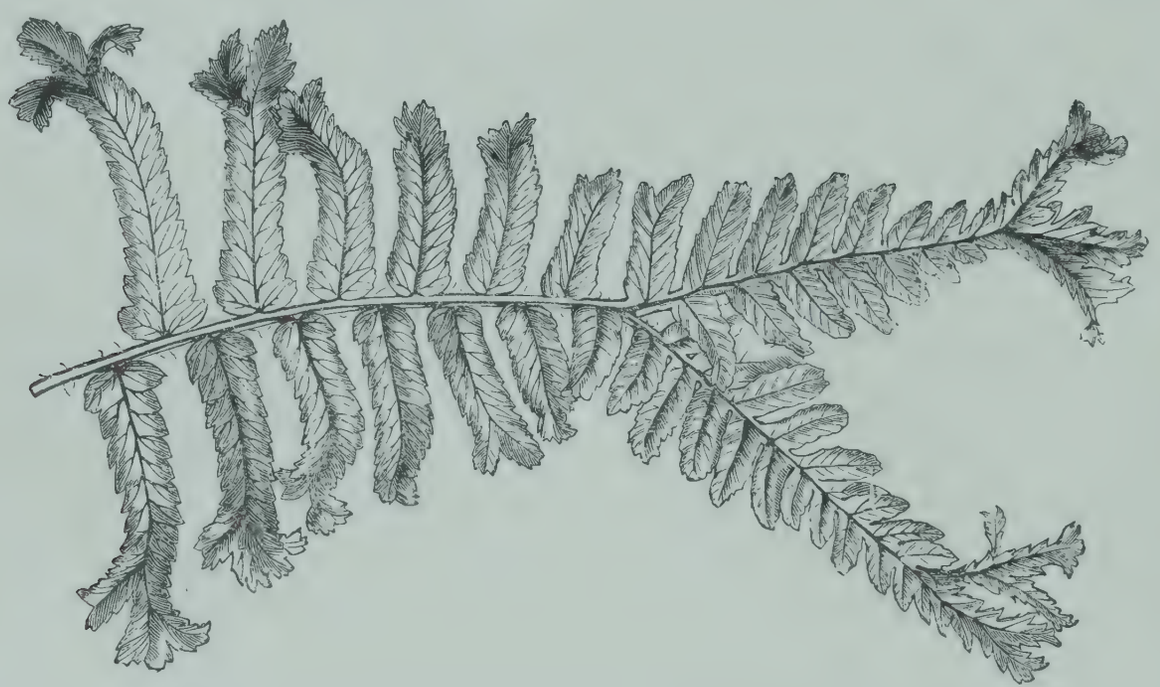


Fig. 125. Upper Portion of Frond of Nephrodium Filix-mas Jervisii (½ nat. size).

broadly spear-shaped fronds, about 4ft. long, are furnished with elongated leaflets, which at their extremities are ornamented with tassels spread out and of a somewhat less tufted nature than in distinctly-crested forms (Fig. 125). —*Lowe*, *Our Native Ferns*, i., figs. 184, 185.

N. F.-m. Loweiæ—Lowe′-ĭ-æ (Mrs. Lowe's), *Lowe*.

This singular variety, of small dimensions, raised from spores in Mrs. E. J. Lowe's Fernery, is as curious as it is distinct, for its fronds, about 1ft. long, and branching and tufted at their extremity, are furnished on one side of the midrib with leaflets of perfect development and crested at their

extremity; but on the other side of the midrib, from the centre to the summit, the leaflets are either almost wanting or very short and narrow.—*Lowe, Our Native Ferns*, i., fig. 226.

N. F.-m. Mapplebeckii—Mapple-beck′-i-i (Mapplebeck's), *Lowe.*

An elegantly-crested form, originally found near Grasmere, in the English Lake District. Its fronds, 1ft. or more long, are many-fingered, forking into two distinct fronds near the base, their basal leaflets being frequently divided in the same manner.—*Lowe, Our Native Ferns*, i., p. 279.

N. F.-m. multicristatum — mul-tic-ris-ta′-tum (many times crested), *Lowe.*

In this very handsome variety, which was raised from spores by Mr. E. J. Lowe, the size and form of the fronds are normal. It, however, strikingly differs from the original *cristatum* in having a greater number of crests, some of the branches commencing in the centre of the leaflet instead of merely at its extremity.—*Lowe, Our Native Ferns*, i., fig. 217.

N. F.-m. Pinderi—Pin′-der-i (Pinder's), *Moore.*

This handsome and essentially distinct form, with very long and narrow fronds of remarkable outline, was originally found near Elter Water, in the Lake District, and subsequently also at Coneysthorpe, near Malton. Its narrowly spear-shaped fronds, borne on short stalks densely clothed with very long scales, are about 3ft. long and less than 6in. broad in their widest part, very much tapered upwards to a long slender point, and tapering also below in the same manner.—*Lowe, Our Native Ferns*, i., fig. 189. *Nicholson, Dictionary of Gardening*, ii., p. 441.

N. F.-m. polydactylum—pol-yd-ac′-tyl-um (many-fingered), *Moore.*

A beautiful, strong-growing variety, originally found at Bromsgrove, in Worcestershire, and distinct from *cristatum* through the multifid (much-cleft), not crested, character of the fronds and the leaflets, which are repeatedly divided and crisped at their extremity. The fronds, 1½ft. to 2ft. long and 6in. to 9in. broad, are furnished with leaflets which do not lessen in width until near the crispy tassel, where they suddenly become much narrowed.

The pinnules (leafits), divided almost to the midrib, are more or less pointed and have their edges toothed.—*Lowe*, *Our Native Ferns*, i., fig. 207. *Nicholson*, *Dictionary of Gardening*, ii., p. 441. *Moore*, *Nature-printed British Ferns*, t. 37.

N. F.-m. propinquum—prop′-in-qŭ-um (approaching), *Wollaston.*

This variety, which Wollaston ranks as a distinct species, is not so coarse-growing as the typical *Filix-mas;* and although it attains a large size, there is a smoothness in the fronds which renders it distinct at first sight. These fronds, 3ft. to 5ft. long, are of a more compact habit, and their leaflets are also shorter and broader for their length, than in the type. The plant is found in various counties in England, in Scotland, and also in Ireland, and is reported from the Channel Islands. Lowe states that where found it is frequently very abundant.—*Lowe*, *Our Native Ferns*, i., fig. 203.

N. F.-m. pumilum—pu′-mil-um (dwarf), *Moore.*

A very rare and pretty little Fern, of erect habit, originally found on Snowdon, and subsequently near Llyn Ogwen, and one which, on account of its very distinct tufted habit and general appearance, Mr. Wollaston considers as a doubtful species, and Lowe figures as such ("Ferns British and Exotic," vi., t. 15). Its elegant little fronds, 9in. to 12in. long, are borne on stalks that are 2in. to 3in. long and clothed with fringed scales; they are furnished with short, blunt, and somewhat deflexed leaflets, deeply cleft, and recurved at their extremity. The form of the fronds and of their leaflets is decidedly concave; and the sori (spore masses) are disposed in a single line on each side the midrib of the leaflets.—*Lowe*, *Our Native Ferns*, i., fig. 218. *Nicholson*, *Dictionary of Gardening*, ii., p. 441.

N. F.-m. ramo-cristatum—ra′-mo-cris-ta′-tum (branched and crested), *Moore.*

A very distinct but somewhat irregular or inconstant form, of dwarf habit, with fronds seldom more than 10in. long, usually three times branched, and crested at their extremities (Fig. 126). C. T. Druery, in his excellent work, "Choice British Ferns," states (p. 109) that the branching of the fronds begins at the base, and that the plant forms a compact and very ornamental bush.

N. F.-m. ramosissimum—ra-mo-sis′-sim-um (much branched), *Moore.*

This strong-growing variety, raised from spores by Mr. Ivery, of Dorking, produces in abundance fronds which are many times branched and densely tufted at their summit (Fig. 127). The branching process sometimes begins near the base of the stalks, while in other cases there is no bifurcation until the lower part of the leafy portion is reached, when the rachis (stalk) becomes branched again and again and terminates in a dense tuft.

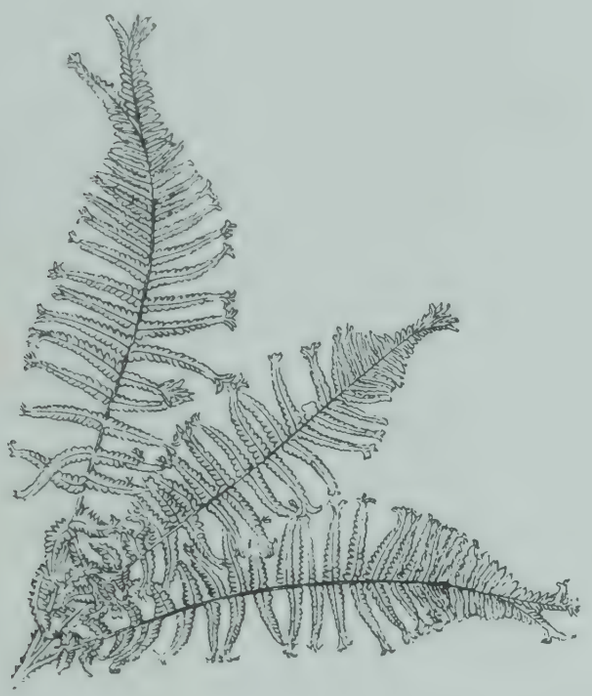


Fig. 126. Frond of Nephrodium Filix-mas ramo-cristatum
(¼ nat. size).

Fig. 127. Frond of Nephrodium Filix-mas ramosissimum
(⅛ nat. size).

N. F.-m. ramosum—ra-mo′-sum (branched), *Moore.*

A variety of dwarf habit and irregular outline, originally found on the Clova Mountains, in Scotland. Its fronds usually have at their base several branches twice divided to the midrib, and their summit is also branched. The small pinnules (leafits) are also blunt and toothed.—*Lowe, Our Native Ferns*, i., fig. 205.

N. F.-m. ramulosissimum—ra-mul-o-sis′-sim-um (having many small branches), *Moore.*

This remarkably pretty variety, the smallest-growing form at present known, is seldom more than 4in. high. Its little fronds are repeatedly

branched, the first bifurcation usually beginning near the base, and each branch ending in an elegant little crest. We have never seen it in fructification or heard of its being fertile, but it is readily propagated by division of the crowns, which are of a dense and tufted character.

N. F.-m. Schofieldii—Scho-field′-ĭ-i (Schofield's), *Sim.*

A pretty, distinct, and really pigmy variety, originally found near Buxton, in Derbyshire. Its fronds, 3in. to 6in. long, are very variable in outline, sometimes symmetrical, simply pinnate (once divided to the midrib), and terminating in a crispy, outspread tuft; more frequently unsymmetrical (irregular) in their development and multifid (much-cleft) at their summit; or occasionally branching from the stalk or from the lower portion of the frond.—*Lowe*, *Our Native Ferns*, i., fig. 216; *New and Rare Ferns*, t. 11. *Nicholson*, *Dictionary of Gardening*, ii., p. 441.

N. F.-m. Scottii—Scot′-tĭ-i (Scott's), *Lowe.*

This singular variety, originally found near Swansea, in South Wales, possesses a curious appearance, produced by the leafy character of its fronds, which are about 1¼ft. long, 5in. broad, and furnished with leaflets closely set and overlapping each other. One half of these leaflets are branched, and all are more or less irregular; usually these branching pinnæ have three pairs of opposite pinnules (leafits) at the base, and these are deeply cut and irregular in shape. The extremity of the frond is also branched.—*Lowe*, *Our Native Ferns*, i., fig. 223.

N. F.-m. Willisonii—Wil-lis-on′-ĭ-i (Willison's), *Moore.*

An interesting variety, of medium dimensions, originally found near Whitby. Its fronds, of a narrow outline, are furnished with leaflets distantly placed and deeply cleft, the intervals between them being occasionally as much as ½in. The pinnules (leafits) are deeply cleft in the same manner, unequal in size, and irregularly toothed.—*Lowe*, *Our Native Ferns*, i., t. 31B; *New and Rare Ferns*, p. 116.

N. F.-m. Winstanleyi—Win-stan′-ley-i (Winstanley's), *Lowe.*

This elegant and slender variety was raised by Mr. E. J. Lowe from spores of *cristatum*, from which it essentially differs in several respects. Its

fronds, simply pinnate (only once divided to the midrib), with segments deeply cut near the base, are 20in. long and only 3½in. broad. It also differs from *cristatum* in having its fronds terminated by a tufted crest, which forms a compact, rounded head, all the margins of which are deeply cut; and also by the shape of its leaflets, which are closely set, narrow, and broadest at the base, the lobes being finely toothed. The fructification in this variety is confined to the upper half of the frond, where the sori (spore masses) are disposed in a single row on either side of the midrib, being much smaller in size and less conspicuous than in *cristatum*. The leaflets near the base of the frond are spread out, much branched, but not tufted at the extremity, and only show a slight tendency to be crested.—*Lowe*, *Our Native Ferns*, i., fig. 228.

N. (Lastrea) firmifolium—Las′-tre-a; fir-mif-ol′-ĭ-um (firm-leaved), *Baker*.

A stove species, of medium dimensions, native of the Andes of East Peru. It is much like *N. acutum*, from which it differs principally in the rigidly-firm texture of its fronds, in their much narrower and less deeply-cut pinnules (leafits), and in its smooth rachises (stalks of the leafy portion).—*Hooker*, *Synopsis Filicum*, p. 501.

N. (Lastrea) Fischeri—Las′-tre-a; Fis-che′-ri (Fischer's), *Baker*.

This stove species, of small dimensions, native of Brazil, has oblong-spear-shaped fronds 6in. to 8in. long and 2½in. to 3in. broad, borne on tufted, smooth stalks 2in. to 3in. long. The short-stalked leaflets, of a thin but firm texture, are cut down to a narrow wing into close, entire, blunt lobes, and are smooth on both surfaces. The sori (spore masses), disposed along the midvein, are covered by a smooth involucre of a persistent nature.—*Hooker*, *Synopsis Filicum*, p. 496.

N. (Lastrea) flaccidum—Las′-tre-a; flac′-cid-um (relaxed), *Hooker*.

A greenhouse species, of medium dimensions, native of the Himalayas, where it occurs at an elevation of 6000ft., also of Ceylon and Java. In general appearance it somewhat resembles some of the least-cut forms of *Asplenium* (*Athyrium*) *Filix-fœmina*. The fronds, 1ft. to 1½ft. long and 6in. to 8in. broad, are borne on slender, naked stalks 1ft. or more long. The

leaflets, 3in. to 4in. long and 1in. broad, are cut down to the midrib, with a distinct, narrow wing, into small, oblong lobes ; the lower ones are distant, shorter than the others, and deflexed (thrown back) ; all are of a soft, papery texture. The sori (spore masses) are disposed about half-way between the edge and the midrib.—*Hooker*, *Species Filicum*, iv., p. 133, t. 263.

N. (Lastrea) flexuosum—Las′-tre-a ; flex-ŭ-o′-sum (flexible), *Baker*.

A stove species, of large dimensions, native of Rio Janeiro, with ample fronds of a peculiar appearance, produced by the zigzag nature of their rachis (stalk of the leafy portion), which is clothed with woolly hairs and spear-shaped scales. The leaflets, oblong-spear-shaped, distinctly stalked, and 8in. to 9in. long, are divided into close, strap-shaped pinnules (leafits), which are again divided into oblong, close, blunt segments of moderately thick texture and clothed with short hairs. The small sori (spore masses), disposed along the midvein, are covered by a smooth involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 501.

N. (Lastrea) floridanum — Las′-tre-a ; flor-id-a′-num (from Florida), *Hooker*.

A very distinct, North American species, of robust growth and peculiar habit, perfectly hardy in this country, where it withstood uninjured, and without protection, the severe winter of 1879-80. According to Eaton, it is called the "Florida Wood Fern," and is found growing in wet woods from Florida to Louisiana. The fronds, which are highly ornamental and of a somewhat leathery texture, are produced from a stout, fleshy, creeping, very chaffy rhizome (prostrate stem), with large, thin, brown scales, and are borne on dark green stalks, which are longer in the fertile than in the barren fronds. The two kinds of fronds are quite dissimilar in appearance. The totally barren ones are much shorter than the others and comparatively broader, being 9in. long and 4½in. broad in the middle. The fertile fronds, 1½ft. to 2ft. long, 6in. to 8in. broad, and oblong-spear-shaped, have their lower leaflets barren and their upper part only fertile ; in the latter portion the leaflets are cut down to a narrowly-winged rachis (stalk) into oblong, slightly notched, blunt leafits, with their own breadth between them, and two rows of rather large sori (spore masses) which reach from the midrib nearly to the edge, and

are covered with a roundish indusium perfectly smooth and of a rather rigid nature.—*Hooker*, *Filices Exoticæ*, t. 99. *Nicholson*, *Dictionary of Gardening*, ii., p. 441. *Eaton*, *Ferns of North America*, ii., t. 67.

N. (Lastrea) fœnisecii—Las′-tre-a ; fœ-nis-ec′-ĭ-i (hay-scented). This is synonymous with *N. æmulum.*

N. (Lastrea) fragrans—Las′-tre-a ; fra′-grans (fragrant), *Richard.*

This is a lovely little greenhouse plant (Fig. 128), usually known in North America as the "Fragrant Wood Fern," on account of the pleasant odour—compared by some authors to that of the Violet and by others to that of the common Primrose—which is emitted by the fronds in a fresh state, and which they retain for many years when preserved dry in the herbarium. Eaton states that it grows in crevices of shaded cliffs, and on mossy banks, especially near cascades and rivulets, from Northern New England to Wisconsin, and northward to Arctic America. It is also reported as being found in the Caucasus and in Siberia, and has also been gathered in quantities by Maximowicz and by Maries at high elevations in Japan, where it is said to give a most pleasant flavour to the tea to which it is sometimes added in that country. The fronds, 6in. to 9in. long, 1½in. broad, and of a somewhat leathery texture, are oblong-spear-shaped, being pointed at their extremity and gradually tapering to a narrow base ; their leaflets are cut down nearly to the rachis (stalk) into oblong lobes, which are again toothed or lobed. These fronds are produced from an upright and rather stout rootstock covered with broad, chaffy scales of a light brown colour, and are borne on short stalks of an equally scaly nature. Each crown generally produces six to eight fronds, but as the crowns are usually found clustered together in a tuft of five or six, they frequently present an agglomeration of thirty or more fronds on one plant. The lower part of the fronds is often quite concealed by sori

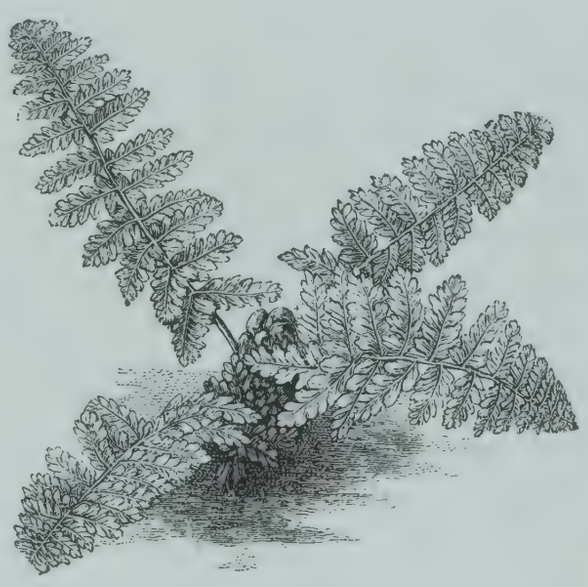


Fig. 128. Nephrodium fragrans (¼ nat. size).

(spore masses), which are covered with a very large involucre of a parchment-like texture. Although a plant of small stature and somewhat rigid appearance, *N. fragrans* is one which deserves to be grown in every collection, if only for its perfume, which is readily detected even if only a single plant is kept.—*Hooker*, *Species Filicum*, iv., p. 122. *Hooker and Greville*, *Icones Filicum*, t. 70. *Nicholson*, *Dictionary of Gardening*, ii., p. 441. *Eaton*, *Ferns of North America*, i., t. 23.

N. (Lastrea) Fraseri—Las′-tre-a ; Fra′-ser-i (Fraser's), *Baker*.

A stove Fern, of large dimensions, native of Ecuador, with fronds 3ft. or more long, 1ft. broad, and borne on dark reddish stalks.—*Hooker*, *Synopsis Filicum*, p. 495.

N. (Lastrea) funestum—Las′-tre-a ; fu-nes′-tum (deadly). A synonym of *N. subquinquefidum*.

N. (Lastrea) Funkii—Las′-tre-a ; Funk′-ĭ-i (Funk's), *Baker*.

This stove species, of small dimensions, native of New Granada, produces spear-shaped fronds 1ft. long and 2in. to 2½in. broad, borne on short stalks, which, like the rachis (stalk of the leafy portion), are clothed throughout with firm, spreading, narrow, dark brown scales. These fronds are bipinnatifid (twice divided nearly to the midrib), being furnished with sessile (stalkless), spear-shaped, bluntish leaflets of a moderately firm texture, cut down to a narrow wing into nearly entire (undivided) lobes, the surfaces of which are of a somewhat downy nature. The sori (spore masses), disposed along the midvein, are covered with a small involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 496.

N. (Lastrea) furcatum—Las′-tre-a ; fur-ca′-tum (forked), *Hooker*.

A stove species, of gigantic dimensions, native of Columbia and Peru. Its ample fronds, 3ft. to 6ft. long and 2ft. or more broad, are borne on stalks 2ft. to 3ft. long, densely clothed with a mass of very narrow, intertangled scales of a rusty brown colour. The lower leaflets, 1ft. to 1½ft. long, 6in. to 9in. broad, and spear-shaped or triangular, are furnished with spear-shaped leafits (pinnules) of a soft, papery texture ; their segments are cut down

nearly to the rachis (stalk) into close, entire lobes, along the midvein of which the sori (spore masses) are abundantly disposed.—*Hooker*, *Species Filicum*, iv., p. 36.

N. (**Lastrea**) **Gardnerianum**—Las′-tre-a ; Gard-ner-ĭ-a′-num (Gardner's), *Baker.*

This greenhouse species, of small dimensions, is a native of the Organ Mountains, Brazil. It is of no particular decorative merit.—*Hooker*, *Synopsis Filicum*, p. 496.

N. (**Pleocnemia**) **giganteum**—Plĕ-oc-ne′-mĭ-a ; gig-ant-e′-um (gigantic), *Baker.*

In habit and texture this large-growing, stove species, native of Ceylon and the Malayan and Philippine Islands, somewhat resembles the better-known *N. cicutarium.* Its ample fronds, 2ft. to 3ft. long, are deltoid (in shape of the Greek delta, Δ), three times divided to the midrib, or four times divided nearly to it, and borne on grey, slightly hairy stalks 1ft. to 1½ft. long, covered at their base with linear (very narrow) scales of a dark brown colour. The lower leaflets, which are much the largest, are also deltoid, unequal-sided, stalked, and furnished with spear-shaped, pinnatifid segments ; while the upper leaflets are spear-shaped, and furnished with broad, blunt lobes, near the main veins of which the sori (spore masses) are disposed in single rows.—*Hooker*, *Synopsis Filicum*, p. 503. *Beddome*, *Ferns of Southern India*, t. 80.

N. (**Lastrea**) **glabellum**—Las′-tre-a ; glab-el′-lum (smoothish). A variety of *N. decompositum.*

N. (**Lastrea**) **glabrum**—Las′-tre-a ; glab-rum (smooth), *Baker.*

A stove species, of small dimensions, much resembling the better-known *N. chinense*, and of little decorative value.—*Hooker*, *Synopsis Filicum*, p. 278.

N. (**Eunephrodium**) **glandulosum**—Eu-neph-ro′-dĭ-um ; glan-dul-o′-sum (glandular), *J. Smith.*

This greenhouse species, native of Assam, the Himalayas, and the Island of Leyte, is of medium dimensions, its fronds, borne on naked or slightly

hairy stalks 1ft. or more long, being seldom more than 1ft. in length and 4in. to 6in. in breadth. These fronds are furnished with from eight to twelve pairs of leaflets, those of the barren fronds being the largest and closest, with their margin entire (undivided) or slightly lobed, and sometimes auricled (eared) at the base. The texture is soft and papery, and the rachis (stalk of the leafy portion), as well as the under-surface, is either naked or slightly hairy, sometimes glandular. The fertile leaflets are contracted, and the sori (spore masses) are disposed close to the midvein.—*Hooker*, *Species Filicum*, iv., p. 76. *Nicholson*, *Dictionary of Gardening*, ii., p. 441. *Beddome*, *Ferns of British India*, t. 132.

N. (Lastrea) Goldieanum—Las′-tre-a ; Gol-die-a′-num (Goldie's), *Hooker*.

A very fine, hardy, North American species, which, according to Eaton, is found growing in deep, rocky woods from Canada and Maine to Indiana, Virginia, and Kentucky. Referring to this Fern, Eaton says ("Ferns of North America," vol. i., p. 309) : "It was collected by Pursh on his visit to America in the early part of this century, the precise locality not known—in the Flora, he says, 'New Jersey to Virginia'—and was by him referred to *Filix-mas*. His specimens, preserved in the Herbarium at Kew, are partly *Goldieanum* and partly *cristatum*. Mr. John Goldie's discovery was made near Montreal in 1818, and the excellent figure in Hooker and Greville's 'Icones Filicum' was probably taken from one of his specimens, or perhaps from live plants originally brought by him to the Botanic Garden at Glasgow." We have it also on the same authority that this Fern is one of the finest and largest of the species of the Eastern States, being surpassed in these respects only by the Osmundas and the Ostrich Fern, and that, although not one of the commonest Ferns, it is very abundant in some localities. The fully-developed fertile fronds, which, like the barren ones, are produced from a creeping or slightly ascending rootstock of a very fleshy nature, several inches long and nearly 1in. thick, are 2ft. to 3ft. long, 1ft. or more broad, and furnished with fifteen to twenty pairs of leaflets of a soft, papery texture ; these leaflets are cut down nearly to the rachis (stalk) into narrow-spear-shaped lobes, with notched edges. The fertile fronds are produced late in the autumn, those forming the first growth being usually barren and shorter than the others. Both kinds are borne on stalks about

1ft. long, of a light green colour, somewhat stout, and clothed at their base with large, dark brown, shining scales, which extend to about half the length of the stalks (Fig. 129). The abundant and conspicuous sori (spore masses) are disposed in rows near the midrib.—*Hooker, Species Filicum*, iv., p. 121. *Hooker and Greville, Icones Filicum*, t. 102. *Nicholson, Dictionary of Gardening*, ii., p. 441. *Eaton, Ferns of North America*, i., t. 40. *Lowe, Ferns British and Exotic*, vi., t. 28.

Fig. 129. Frond of Nephrodium Goldieanum
(¼ nat. size).

N. (Lastrea) gracile—Las′-tre-a ; grac′-il-e (slender). A variety of *N. sparsum.*

N. (Lastrea) gracilescens — Las′-tre-a ; grac-il-es′-cens (very slender), *Hooker.*

A greenhouse species, native of Japan, China, and Northern India, and of very graceful habit. Indeed, a great charm is imparted to it by the

particularly slender nature of its elegant fronds, which are of peculiarly narrow dimensions when compared with their height. These fronds are borne on slender stalks 6in. to 9in. long, slightly hairy, and produced from a wide-creeping rhizome (prostrate stem); and although their leafy portion is frequently 1½ft. long, it is rarely more than 6in. broad. The leaflets, 2in. to 3in. long and ½in. broad, are cut down to within a short distance of the rachis (stalk) into close, narrow-oblong lobes, the lowest pair of which are usually thrown back. The sori (spore masses) are nearly terminal and are covered with a naked involucre.—*Hooker*, *Species Filicum*, iv., p. 93.

N. (Sagenia) Griffithii—Sag-e′-nĭ-a; Grif-fith′-ĭ-i (Griffith's), *Baker.*

A strong-growing, stove species, with fronds 3ft. to 4ft. long, borne on brownish stalks 1ft. to 2ft. long; they consist of a large terminal leaflet cut down nearly to the rachis (stalk of the leafy portion) into spear-shaped divisions, and several leaflets on each side 1ft. or more long and nearly as broad, of a soft, papery texture and light green in colour. The rather large sori (spore masses) are disposed in two rows, nearly all terminating the veinlets.—*Hooker*, *Synopsis Filicum*, p. 300. *Beddome*, *Ferns of British India*, t. 337.

N. (Lastrea) Grisebachii — Las′-tre-a; Grise-bach′-ĭ-i (Grisebach's), *Baker.*

A stove species, of gigantic dimensions, native of Cuba, much in the way of the better-known *N. setigerum*, from which it differs principally by its larger size, and also by the stalks of its fronds being densely clothed at the base with spear-shaped scales fully 1in. long, which leave distinct tubercles when they fall.—*Hooker*, *Species Filicum*, iv., p. 264.

N. (Eunephrodium) guadalupense — Eu-neph-ro′-dĭ-um; guad-al-u-pen′-sĕ (from Guadaloupe), *Fée.*

A stove species, very closely related to *N. abruptum*, from which it differs in the dull green colour of both surfaces of its fronds, and in the slightly downy character of the ribs; the veins are also much closer than those of *N. abruptum*.—*Hooker*, *Synopsis Filicum*, p. 503.

PLATYCERIUM GRANDE.

N. (**Lastrea**) **guatemalense** — Las′-tre-a ; gua-tem-a-len′-sĕ (from Guatemala), *Baker.*

This stove species, which is also found at Chiapas, South Mexico, has the external appearance of a diminutive form of *N. effusum;* but its narrowly-triangular fronds, three times divided nearly to the midrib, and borne on glossy, brown stalks 9in. to 12in. long and downy upwards, are seldom 1ft. in length, being of a rigid but thin texture and dull green on both surfaces. The sori (spore masses), of medium size, are disposed along the midvein and covered with a smooth, persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 498.

N. (**Eunephrodium**) **Haenkeanum**—Eu-neph-ro′-dĭ-um ; Haenk-ĕ-a′-num (Haenke's), *Presl.*

A stove species, native of Ceylon and the Malayan and Fiji Islands. It resembles the better-known *N. cucullatum*, but is of much larger dimensions ; its fronds, borne on strong, upright, slightly hairy stalks 2ft. long, sometimes measuring 4ft. in length and 1¼ft. in breadth. It is also of a less hairy nature than that species, and its sori (spore masses) are provided with an involucre of a very fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 290.

N. (**Lastrea**) **Harveyi**—Las′-tre-a ; Har-vey′-i (Harvey's), *Baker.*

This stove species, native of Viti and Samoa, produces from a wide-creeping rhizome (prostrate stem) its oblong-spear-shaped fronds, which are 2ft. to 3ft. long, 1ft. to 1½ft. broad, bipinnatifid (twice divided nearly to the midrib), and borne on grey stalks 6in. to 12in. long and slightly scaly at the base. The stalkless leaflets are narrow-strap-shaped, 6in. to 9in. long, ½in. broad, closely set, and cut down to a narrow wing into close, strap-shaped lobes of a parchment-like texture and of a bright green colour on both surfaces. The sori (spore masses), disposed on the margins, are furnished with a persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 497.

N. (**Pleocnemia**) **heterophyllum**—Plĕ-oc-ne′-mĭ-a ; het-er-oph-yl′-lum (variable-leaved), *Hooker.*

A small-growing, stove species, native of the Philippine Islands, with fronds 5in. to 6in. long, divided into blunt, oblong or slightly sickle-shaped lobes reaching a quarter of the distance to the midrib. These fronds are

of a leathery texture and hairy on both surfaces, especially along the edge and upon the midrib beneath ; they are produced from a creeping rhizome (prostrate stem), and are borne on stalks 2in. to 4in. long and of a densely hairy nature.—*Hooker*, *Species Filicum*, iv., p. 62 ; *Second Century of Ferns*, t. 20.

N. (Sagenia) heterosorum—Sag-e′-nĭ-a ; het-er-os-o′-rum (having sori of variable shape), *Baker*.

A stove species, native of Chittagong, with fronds 2ft. or more in length, deltoid (in shape of the Greek delta, Δ), and once divided to the midrib. The leaflets, conspicuously stalked, broadly strap-shaped, and irregularly lobed, are gemmiparous (provided with leaf-buds in the axils), of a thin but firm texture, and of a uniform bright green colour. The copious scattered sori (spore masses) vary in shape and are often confluent (running into one another).—*Hooker*, *Synopsis Filicum*, p. 504. *Beddome*, *Ferns of British India*, t. 47.

N. (Eunephrodium) hirsutum—Eu-neph-ro′-dĭ-um ; hir-su′-tum (hairy), *J. Smith*.

This large-growing, stove species, native of the Philippine Islands, must not be confounded with *N. hirsutum* of Don, which is synonymous with *N. odoratum*. In J. Smith's *N. hirsutum*, the fronds, 3ft. to 4ft. long, 1½ft. broad, and borne on strong, grey, hairy stalks 1ft. or more in length, have their leaflets very closely set and spreading, the largest sometimes measuring 10in. in length. These leaflets are cut half-way down to the midrib into entire, narrow-oblong lobes, the lower ones being provided with a gland beneath at the base. The texture is somewhat leathery, and the sori (spore masses) are disposed along the midvein.—*Hooker*, *Species Filicum*, iv., p. 70, t. 240B.

N. (Lastrea) hirtipes—Las′-tre-a ; hir′-tip-ēs (hairy-stalked), *Hooker*.

This very handsome, hardy species, better known in gardens under the name of *Lastrea atrata*, is a native of the Himalayas, where it is found up to 6000ft. elevation, and, according to Beddome, it also grows in great abundance on the Neilgherries at 4000ft. and upwards. The general habit of the plant is that of our common *N. Filix-mas ;* but its gracefully-arching fronds, 2ft. to 3ft. long, 8in. to 16in. broad, and produced from a short, thick,

and very fleshy caudex (stem) rarely measuring 6in. above the ground, are borne on tufted stalks 1ft. or more in length. The long, rough, black or very dark, chaffy scales with which these stalks are densely clothed, give a most conspicuous appearance to the whole plant, which is also rendered all the more decorative by the way in which the fronds are disposed, forming as it were a natural vase of beautiful dark green colour. The pinnæ (leaflets), 4in. to 8in. long and nearly 1in. broad, are cleft into broad, blunt lobes, reaching from a quarter to one-third of the way down to the midrib (Fig. 130); and the large and conspicuous sori (spore masses) are disposed along the midvein.

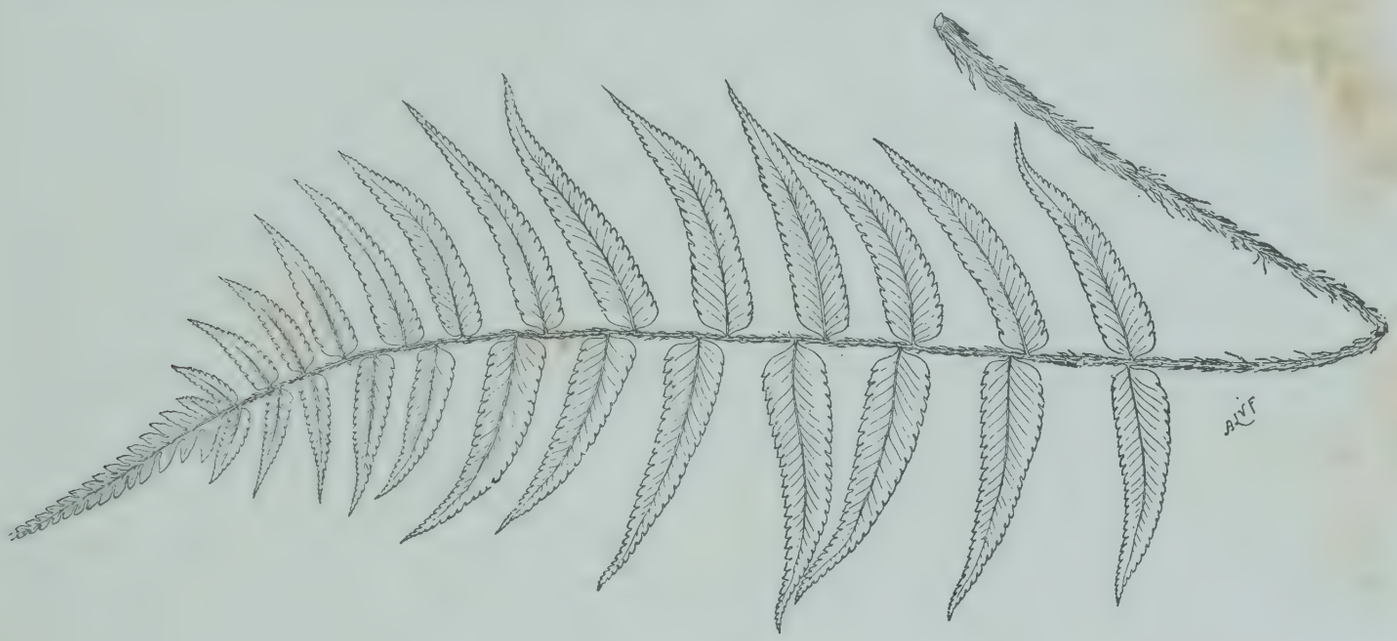


Fig. 130. Frond of Nephrodium hirtipes
(⅛ nat. size).

A singular character, quite peculiar to this plant, is that during the winter the stalks get very soft and brownish at their base, and the fronds have then a tendency to fall around the plant; in that state, however, they retain their colour and freshness for several months if only held up by a little black thread, which can easily be concealed from view.—*Hooker*, *Species Filicum*, iv., p. 115, t. 249. *Nicholson*, *Dictionary of Gardening*, ii., p. 441. *Beddome*, *Ferns of Southern India*, t. 96.

N. (Lastrea) hirtum—Las′-tre-a; hir′-tum (hairy), *Hooker.*

A pretty, stove species, native of the West Indies, seldom more than 1ft. high, including the wiry, brown, densely shaggy stalks, 4in. to 6in. high,

on which the fronds are borne. These fronds, of a somewhat triangular shape, 4in. to 6in. high and 3in. to 4in. broad, have their lowest leaflets much larger than the others; and the lowest pinnules (leafits), also larger than the others, are cut down to the rachis (stalk) below into spathulate (spoon-shaped), usually entire, blunt lobes. The whole leafy portion of the frond is of a soft, papery texture and bright green colour, and the small and abundant sori (spore masses) are disposed at a little distance from the midrib.—*Hooker*, *Species Filicum*, iv., p. 128.

N. (Eunephrodium) hispidulum — Eu-neph-ro′-dĭ-um; his-pid′-ul-um (somewhat rough), *Baker*.

A stove species, of medium dimensions, native of the Philippine and Malayan Islands; it is closely related to *N. Arbuscula*, but has narrower and more deeply-lobed leaflets.—*Hooker*, *Species Filicum*, iv., p. 69.

N. (Lastrea) hispidum—Las′-tre-a; his′-pid-um (hispid, rough), *Hooker*.

This lovely, greenhouse species, native of New Zealand, is also found, though rarely, in Australia; it is a well-marked plant of medium dimensions. The elegantly-arching fronds, 1ft. to 1½ft. long, 8in. to 12in. broad, of a somewhat triangular shape, and produced from a stout, creeping rhizome (prostrate stem), are borne on wiry, brown stalks 1ft. to 1½ft. long, clothed with squarrose (rough), nearly black, narrow scales. The spear-shaped leaflets have their lowest pinnules (leafits) larger than the others, each leafit being cut down to a winged rachis (stalk) into small, oblong or linear (very narrow), sharply-toothed lobes of a leathery texture, dark green colour, and particularly shining nature. The abundant and conspicuous sori (spore masses) almost entirely cover the under-side of the fertile fronds.—*Hooker*, *Species Filicum*, iv., p. 150. *Nicholson*, *Dictionary of Gardening*, ii., p. 441.

N. hispidum is particularly adapted for growing in a Fern-case in the dwelling-room, where, in the company of Todeas and other Filmy Ferns, it will be found to thrive admirably; indeed, it is a plant rather difficult to manage in the open house, unless a close and shaded corner can be devoted to it. Either as a pot plant or planted out it forms a beautiful and interesting object.

N. (Eunephrodium) Hookeri—Eu-neph-ro′-dī-um ; Hook′-er-i (Hooker's). Synonymous with *N. Arbuscula.*

N. (Lastrea) Hopeanum — Las′-tre-a ; Ho-pe-a′-num (Lieut. Hope's), *Baker.*

A stove species, of medium dimensions, native of Polynesia, with oblong-spear-shaped fronds 1ft. long, 6in. to 7in. broad, borne on naked, glossy grey stalks 1ft. to 1¼ft. long, and bipinnatifid (twice divided nearly to the midrib). The distant, stalkless leaflets are cut down to a narrow wing into strap-shaped, entire lobes of a somewhat leathery texture and dull green on both surfaces. The sori (spore masses), disposed in a crowded manner close to the midrib, are covered by a firm involucre of a persistent nature.—*Hooker*, *Synopsis Filicum*, p. 494. *Nicholson*, *Dictionary of Gardening*, iv., p. 573.

N. (Lastrea) Hornei—Las′-tre-a ; Hor′-nĕ-i (Horne's), *Baker.*

A stove species, native of the Seychelles. Its large fronds are deltoid (in shape of the Greek delta, Δ), 2ft. to 3ft. each way, quadripinnatifid (four times divided nearly to the midrib), and borne on robust stalks of a naked, glossy nature. The lowest leaflets, also deltoid, are much the largest ; their lowest leafits (pinnules) and segments, closely set and spear-shaped, are sharply pointed at their extremity and winged to the base ; the final lobes are oblong and notched. The fronds are of a parchment-like texture, smooth, and bright green on both surfaces. The small sori (spore masses), nearly marginal and restricted to the lobes, are covered with a smooth and somewhat persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 500.

N. (Eunephrodium) Hudsonianum—Eu-neph-ro′-dī-um ; Hud-so-nĭ-a′-num (Hudson's). A synonym of *N. truncatum.*

N. (Lastrea) inæquale—Las′-tre-a ; in-æ-qua′-lĕ (unequal), *Hooker.*

This is a greenhouse species, native of Cape Colony and Natal ; it is of medium dimensions, intermediate in habit between *N. spinulosum* and the large forms of *N. Filix-mas.* The fronds, borne on stalks 1ft. or more long, with a dense tuft of reddish-brown scales at the base and a few spreading upwards, are 1ft. to 2ft. long and 8in. to 12in. broad, and have their lower leaflets rather shorter and broader than the others, which are 6in. to 8in. long

and 2in. to 3in. broad. The leafits (pinnules), usually spear-shaped, of a soft, papery texture and dark green, are cut down nearly to the rachis (stalk) into oblong, toothed segments. The sori (spore masses), disposed in two rows near the midribs, are covered with a firm, smooth involucre.—*Hooker*, *Species Filicum*, iv., p. 125. *Nicholson*, *Dictionary of Gardening*, ii., p. 441.

N. (Eunephrodium) incisum — Eu-neph-ro′-dĭ-um ; in-ci′-sum (cut), *Baker.*

This stove species, native of the West Indies and New Granada, is of medium size and of peculiar appearance, on account of its narrow-oblong fronds, 1ft. or more long and ¾in. to 1½in. broad, being provided with triangular or spear-shaped lobes, often not reaching more than one-third down to the rachis (stalk). These fronds, of a somewhat leathery texture, finely hairy on their under-surface, and borne on tufted stalks 2in. to 4in. long and scaly below, are very gradually narrowed towards their base so as to form a scarcely-cut wing to the stalk. The nearly marginal sori (spore masses) are covered with an involucre of a very fugacious nature.—*Hooker*, *Species Filicum*, iv., p. 65.

N. (Lastrea) insigne—Las′-tre-a ; in-sig′-nĕ (remarkable), *Baker.*

A greenhouse species, native of New Granada, with fronds 1ft. long and about 9in. broad, furnished with opposite, stalkless leaflets 4in. to 5in. long, cut down two-thirds of the way to the rachis (stalk) into close, oblong, blunt lobes, the lower ones being deflexed (thrown back). The fronds are of a thin texture, naked on both sides, and their sori (spore masses), disposed along the midvein, are covered with a very small, slightly hairy involucre.—*Hooker*, *Synopsis Filicum*, p. 262.

N. (Lastrea) intermedium—Las′-tre-a ; in-ter-med′-ĭ-um (intermediate), *Baker.*

This greenhouse species, also known as *N. Blumei*, is a native of India and Japan ; it is a very striking plant, of easy culture. The somewhat triangular fronds, 2ft. to 3ft. long and 1ft. to 1½ft. broad, are borne on stout, erect stalks 1ft. to 2ft. long, densely clothed at the base with long, silky scales of a peculiar bright brown colour. The lower leaflets, spear-shaped and

often 1ft. long and 4in. to 5in. broad, are divided into close, spear-shaped pinnules (leaflits), with oblong-spear-shaped segments and strap-shaped, nearly entire lobes of a soft texture. The small and copious sori (spore masses), disposed nearer the midrib than the edge, are covered with a thin involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 283. *Nicholson*, *Dictionary of Gardening*, ii., p. 441. *Beddome*, *Ferns of Southern India*, t. 249.

N. (Eunephrodium) invisum—Eu-neph-ro′-dĭ-um ; in-vi′-sum (unseen), *Carruthers.*

This stove species, native of the Polynesian Islands, where it is common, is one of the most striking as well as one of the most robust known ; it is well suited for a large Fernery on account of its bold habit and its easy culture. The handsome fronds, produced from a wide-creeping, stout rhizome (prostrate stem), and borne on stout, brownish stalks 1ft. or more in length and hairy, are 1½ft. to 2ft. long and 8in. to 12in. broad. The numerous leaflets, 4in. to 5in. long, are cut about one-third of the way down into sharp, triangular, falcate (sickle-shaped) lobes of a somewhat leathery texture. The sori (spore masses) are disposed in rows close to the midrib.—*Hooker*, *Synopsis Filicum*, p. 290. *Nicholson*, *Dictionary of Gardening*, ii., p. 441.

N. (Sagenia) irregulare—Sag-e′-nĭ-a ; ir-reg-ul-a′-rĕ (irregular). This is synonymous with *N. latifolium.*

N. (Lastrea) Jenmani—Las′-tre-a ; Jen′-man-i (Jenman's), *Baker.*

A stove species, native of Jamaica, with fronds about 2ft. long, 8in. to 12in. broad, and borne on stout, upright stalks of a scaly nature. They are bipinnate (twice divided to the midrib), their leaflets being copiously dotted with pellucid or semi-transparent spots.—*Nicholson*, *Dictionary of Gardening*, iv., p. 573.

N. (Lastrea) Karwinskyanum — Las′-tre-a ; Kar-win-skў-a′-num (Karwinsky's), *Baker.*

A stove species, of medium dimensions, native of Mexico and Guatemala, with triangular fronds 1ft. to 1¼ft. long, 8in. to 12in. broad, borne on slender stalks 6in. to 9in. long and slightly scaly at the base. The lowest leaflets, which are much the largest, are oblong-triangular in shape, and are provided

with close, spear-shaped pinnules (leafits) cut down below nearly to the midrib into oblong, bluntly-toothed lobes of a soft, papery texture, at the base of which the sori (spore masses), covered with a prominent, ciliated involucre, are disposed.—*Hooker*, *Synopsis Filicum*, p. 279.

N. (Lastrea) Kaulfussii—Las′-tre-a ; Kaul-fus′-sĭ-i (Kaulfuss's), *Hooker*.

This stove species, of medium dimensions, is a native of Brazil and the West Indies. Its fronds, borne on slender and slightly hairy stalks 4in. to 6in. long, are 1½ft. to 2ft. long, 6in. to 8in. broad, and oblong-spear-shaped. Their leaflets, 3in. to 4in. long, are cut down nearly to the rachis (stalk) into spreading, entire, blunt lobes, of a soft, papery texture, and finely hairy on their under-surface. The sori (spore masses), disposed along the midrib, are covered by a fugacious involucre.—*Hooker*, *Species Filicum*, iv., p. 97. *Nicholson*, *Dictionary of Gardening*, ii., p. 441.

N. (Lastrea) lanceolatum — Las′-tre-a ; lan-cĕ-ol-a′-tum (spear-shaped), *Baker*.

This pretty, stove species, native of Coban, Guatemala, is of small dimensions ; its elegant, spear-shaped fronds are tripinnatifid (three times divided nearly to the midrib) and seldom measure more than 1ft. in length, including the tufted and minutely-scaly stalks on which they are borne. The short-stalked leaflets, also spear-shaped and wedge-shaped at their base on the lower side, are cut into strap-shaped, blunt pinnules (leafits) with blunt lobes, of a moderately firm texture, smooth on their upper surface, their under-side being densely scaly on the midribs. The sori (spore masses), disposed close to the midrib and only one to each lobe, are covered with a smooth, persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 498.

N. (Lastrea) lancilobum—Las′-tre-a ; lan-cil′-ob-um (having spear-shaped lobes), *Baker*.

A greenhouse species, of medium dimensions, native of Queensland, and very striking on account of the dark green colour and finely-hairy nature of its fronds, which are deltoid (in shape of the Greek delta, Δ), 1ft. to 2ft. each way, and quadripinnatifid (four times divided nearly to the midrib). These fronds are borne on greyish stalks 1ft. long, and their lower leaflets, much the largest, are slightly stalked. The lowest pinnules (leafits) and

segments are spear-shaped, as are also the final lobes, near the border of which the small sori (spore masses), covered with a minute, fugacious involucre, are disposed in two rows.—*Hooker*, *Synopsis Filicum*, p. 499.

N. (Sagenia) latifolium—Sag-e′-nĭ-a ; la-tif-ol′-ĭ-um (broad-leaved), *Baker*.

This stove species, native of the Polynesian Islands, and better known in gardens under the name of *Sagenia irregularis*, has fronds 2ft. to 3ft. long and 1ft. to 1½ft. broad, borne on ebeneous (blackish), glossy stalks 1ft. or more in length. Their apex or summit is deeply pinnatifid, showing spear-shaped, sharp-pointed lobes cut down nearly to the midrib ; below this there are from three to five leaflets on each side, the lowest much the largest, being 8in. to 12in. long and 6in. to 8in. broad, of a soft, papery texture, the greyish colour showing up conspicuously the main veins, which are distinct to the edge, and a network of fine veinlets upon which the sori (spore masses) are disposed in rows, principally close to the main veins.—*Hooker*, *Synopsis Filicum*, p. 298.

N. (Lastrea) latifrons—Las′-tre-a ; la′-tif-rons (large-fronded), *Hooker*.

This stove species, native of the Sandwich Islands, in habit somewhat resembles some of the large forms of our common *N. Filix-mas*. Its somewhat triangular fronds, 2ft. to 3ft. long, borne on strong, upright stalks about 1ft. long and densely clothed with light brown, deciduous scales, have their leaflets, the lowest of which often measure 1ft. in length and 6in. in breadth, divided into sharp-pointed, spear-shaped pinnules (leafits) cut down about half-way to the midrib into blunt lobes about ¼in. broad. These lobes are of a soft, papery texture, bright green and smooth on their upper surface, while their under-surface, on which fine glands may be observed, is of a mealy appearance. The large and conspicuous sori (spore masses) are covered by a broad, smooth involucre.—*Hooker*, *Species Filicum*, iv., p. 138.

N. (Lastrea) lepidotum—Las′-tre-a ; lep-id-o′-tum (scaly). A variety of *N. dilatatum*.

N. (Lastrea) lepidum—Las′-tre-a ; lep′-id-um (pretty), *Baker*.

This remarkably elegant, greenhouse Fern (see Plate), which originated at the Pine-Apple Nursery, Edgware Road, London, may be a distinct species,

though it has all the appearance of a deeply-contracted form of the popular *N. patens*, of which it possesses most of the outward characters. We fail to find any positive record as to how it was introduced in this country; all that can be gathered with certainty is that it was sent out in 1886 by Messrs. E. G. Henderson and Sons, in whose establishment it had been raised by their general manager, Mr. James O'Brien, from spores received by himself from a friend residing in Brazil. Its fronds, somewhat narrow-egg-shaped, but terminating in a tapering point, are borne on roundish stalks 5in. to 6in. long, green above and brownish below, where they are clothed with light brown scales, similar scales densely covering the crown from which they are produced. These fronds are 1½ft. to 2ft. long and 8in. to 9in. broad in their widest part, and are furnished with very short-stalked leaflets, disposed alternately (not opposite), and cut nearly to the midrib into sharp-pointed lobes connected with it by a broad wing. Each of the leaflets, of a soft, papery texture and deep green colour, is provided at its base with a pair of distinct, though narrow, auricles (ears), hiding the short stalks on which they are borne; these ears extend along the rachis (stalk of the leafy portion), reaching from one leaflet to another. The abundant and conspicuous sori (spore masses) are placed near the midribs on each side, and are covered with inflated, kidney-shaped, lead-coloured, persistent involucres.

N. (Lastrea) Lepinei—Las′-tre-a; Lep-i′-nĕ-i (Lepine's), *Baker*.

A robust, stove species, native of Tahiti, with fronds 6ft. long and quadripinnatifid (four times divided nearly to the midrib). The leaflets, distinctly stalked and deltoid (in shape of the Greek delta, Δ), are furnished with short-stalked, oblong-spear-shaped pinnules (leafits), which in their turn are cut into oblong-spear-shaped segments, with lobes bluntly toothed. The fronds are smooth on both surfaces and of a dull green colour. The sori (spore masses) are marginal, being disposed at the ends of the teeth.—*Hooker, Synopsis Filicum*, p. 501.

N. (Lastrea) Leprieurii—Las′-tre-a; Lep-rieur′-ĭ-i (Leprieur's), *Hooker*.

A stove species, of large dimensions, native of Guiana and of the Andes of North-Eastern Peru, with fronds 2ft. to 3ft. long, 1ft. to 1¼ft. broad, borne on grey stalks 1ft. to 2ft. long and hairy. The leaflets are cut down to

within a short distance of the midrib into small lobes, furnished with a prominent gland at the base, and are of a leathery texture. The sori (spore masses), disposed along the midvein, are covered with a firm, hairy involucre. —*Hooker, Species Filicum*, iv., p. 106.

N. (Pleocnemia) Leuzeanum—Plĕ-oc-ne′-mĭ-a; Leuz-ĕ-a′-num (Leuze's), *Hooker.*

This very handsome, robust-growing, stove species, native of Northern India, Luzon, China, the Philippines, Mishmee, Assam, Sylhet, Burmah, and the Fiji Islands, produces from a somewhat arborescent stem, densely scaly at the crown, its almost triangular fronds, which are 4ft. to 6ft. long, and borne on stout stalks 2ft. to 3ft. long and densely clothed at their base with very narrow, curly, dark brown scales; these scales, though found on nearly the whole length of the stalks, get gradually less as the leafy portion of the frond is approached. The leaflets, 1ft. to 1½ft. long and 6in. to 8in. broad, are divided into oblong, somewhat sickle-shaped segments (see Plate, for which we are indebted to Messrs. W. and J. Birkenhead) 3in. to 4in. long, the lowest on the lower side usually showing three or four distinct pinnules (leafits) cut down to the bare midrib, the other parts of the same segments being cleft only to a broadly-winged midrib into entire or undulated lobes. The abundant but comparatively small sori (spore masses) are usually disposed in close, single rows in the lobes, and covered with a very fugacious involucre.—*Hooker, Species Filicum*, iv., p. 61. *Nicholson, Dictionary of Gardening*, ii., p. 441. *Beddome, Ferns of British India*, t. 134.

N. (Eunephrodium) Levyi — Eu-neph-ro′-dĭ-um; Le′-vy-i (Levy's), *Baker.*

A greenhouse species, native of Nicaragua, of small dimensions and of little decorative value. Its fronds, including the grey-hairy stalks on which they are borne, seldom measure more than 1ft. in length; they are of a dull green colour and slightly downy on both surfaces.—*Hooker, Synopsis Filicum*, p. 502.

N. (Lastrea) Lindeni—Las′-tre-a; Lin′-den-i (Linden's), *Baker.*

A pretty, greenhouse species, of small dimensions, native of Mexico and Guatemala. Its spear-shaped fronds, 6in. to 9in. long, 2in. to 3in. broad,

and bipinnatifid (twice divided nearly to the midrib), are borne on tufted, slender, grey stalks 3in. to 6in. long and densely clothed near the base with spreading, narrow, brown scales. The spear-shaped, short-stalked leaflets are cut down nearly to the midrib into close, blunt lobes of a peculiarly cleft and notched nature and of a membranous texture. The small sori (spore masses), disposed along the midvein, are covered with an involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 493.

N. (Sagenia) Lobbii—Sag-e′-nĭ-a ; Lob′-bĭ-i (Lobb's), *Baker.*

This stove species, native of Borneo, is particularly striking on account of its somewhat triangular fronds, about 1ft. each way and borne on naked stalks 6in. or more long, being composed of a terminal leaflet 4in. to 6in. long, tapering gradually from the middle to each end, and two similar lateral ones on each side, the lower long-stalked and tripartite (divided into three parts). The texture is somewhat leathery, and the abundant sori (spore masses) are scattered over the whole under-side of the fronds.—*Hooker*, *Species Filicum*, iv., p. 59, t. 232.

N. (Eunephrodium) longipes — Eu-neph-ro′-dĭ-um ; long′-ip-ēs (long-footed), *Moore.*

A stove species, of large dimensions, native of Java. It is of peculiar appearance, through the long stalks, 3ft. to 4ft. long, upon which its fronds, about 3ft. long and 9in. to 10in. broad, are borne. The leaflets, about 5in. long and ¾in. broad, are cut two-thirds of the way down into oblique, rather sharp, oblong lobes, with a distinct sinus (depression) between them ; they are of a somewhat leathery texture, and their upper surface is densely hairy on the veins. The sori (spore masses) are disposed about midway between the midrib and the edge.—*Hooker*, *Synopsis Filicum*, p. 290.

N. (Sagenia) macrophyllum — Sag-e′-nĭ-a ; mac-roph-yl′-lum (large-leaved), *Baker.*

This is a very distinct, stove species, native of the West Indies, Tropical America, and Brazil. Its handsome fronds, borne on tufted, dull-brownish stalks 1ft. to 2ft. long and scaly below, are 2ft. to 3ft. long, 1ft. or more broad, and composed of a large terminal leaflet, often forked at the base, and from

four to eight lanceolate (spear-shaped) lateral ones on each side: these are either entire or slightly lobed, the lowest pair being distinctly forked at the base. The fronds are of a soft, papery texture, pale green, and usually naked on both surfaces. The sori (spore masses), which are kidney-shaped and disposed in two rows between each primary vein, are usually situated on the middle of a veinlet.—*Hooker*, *Species Filicum*, iv., p. 56. *Lowe*, *Ferns British and Exotic*, vi., t. 46.

N. (Sagenia) mamillosum—Sag-e′-nĭ-a; mam-il-lo′-sum (nippled), *Baker*.

A stove species, native of the Moluccas, and somewhat resembling *N. decurrens*, from which species, however, it is easily distinguished through its leaflets being undivided, and especially through the peculiar nature of its sori (spore masses), which are so deeply immersed in the frond as to make the upper surface appear as if covered with minute nipples.—*Nicholson*, *Dictionary of Gardening*, iv., p. 573.

N. (Lastrea) marginale — Las′-tre-a; mar-gin-a′-lĕ (having marginal spore masses), *Michaux*.

This handsome, hardy species, which in general habit is about midway between the typical form of *N. Filix-mas* and *N. cristatum*, is deserving of a much more general cultivation than is the case at present. It is a native of North America, where it is known under the popular name of "Evergreen Wood Fern," and whence, according to Lowe, it was introduced into the Royal Gardens, Kew, so far back as 1712. Eaton says it is one of the most abundant and characteristic Ferns confined to North America; it is found in New Brunswick, Arkansas, and Central Alabama; it was also gathered by Drummond on the Saskatchewan and on the Rocky Mountains of British America; and Eaton further informs us that it grows "on rocky hill-sides in rich woods, especially where black leaf-mould has gathered between the masses of rocks." The spear-shaped fronds, 1½ft. to 2ft. long and 6in. to 8in. broad, are borne on stalks 6in. to 12in. long, clothed principally at the base with shining scales of a light brown colour. They are bipinnate (twice divided to the midrib), with leaflets 3in. to 4in. long, 1in. to 1½in. broad, of a more leathery texture than those of most other species belonging to the genus, and also of a darker green colour. The pinnules (leafits) are oblong, blunt at

the extremity, and nearly entire, though occasionally lobed or indistinctly toothed (Fig. 131). The large and prominent sori (spore masses) are disposed along the margin of the leafits, and are covered with a firm, roundish-kidney-shaped, lead-coloured involucre.—*Hooker*, *Species Filicum*, iv., p. 122. *Nicholson*, *Dictionary of Gardening*, ii., p. 441. *Eaton*, *Ferns of North America*, ii., t. 55. *Lowe*, *Ferns British and Exotic*, vi., t. 6.

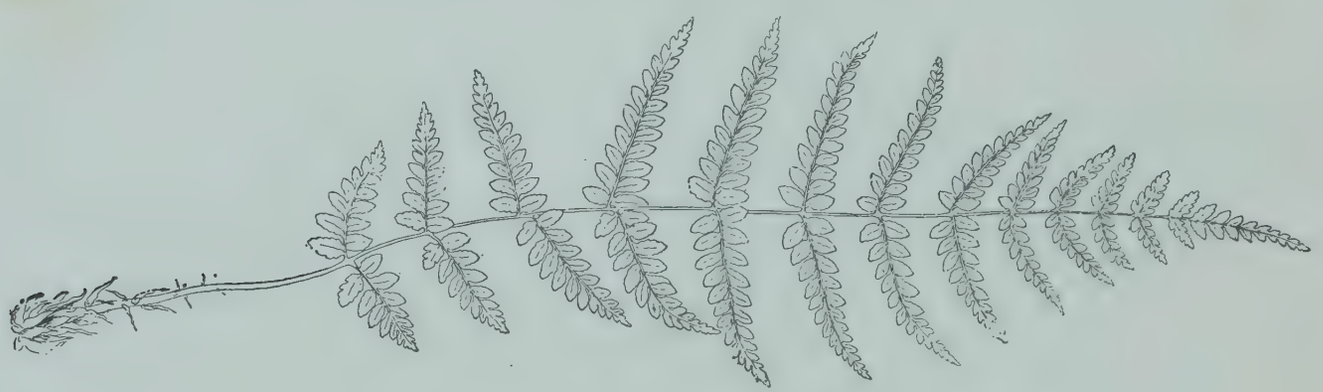


Fig. 131. Frond of Nephrodium marginale
(⅛ nat. size).

In cultivation, *N. marginale* stands our winters outside very well, but in that case it becomes deciduous, although it is quite evergreen in the greenhouse. When planted in the outdoor rockery, a situation neither too wet nor too dry should be selected for it.

There exists in America a variety *elegans* in which, although of smaller growth, the fronds have most of their leafits twice or even three times as long as those of the type, and all pinnatifid (divided nearly to the midrib), thus making a very distinct plant.

N. (Lastrea) Maximowiczii — Las′-tre-a ; Max-im-ow-ic′-zĭ-i (Maximowicz's), *Baker*.

A distinct, greenhouse species, of medium growth, native of Yokohama, with fronds deltoid and quadripinnatifid (in shape of the Greek delta, Δ, and four times divided nearly to the midrib), seldom more than 1ft. each way, and borne on light brown, glossy stalks 6in. to 8in. long, clothed with scattered scales throughout. The lowest leaflets, much the largest and long-stalked, are produced on the lower side ; their lowest leafits and segments, also deltoid and stalked, are cuneate (wedge-shaped) at the base, and the final lobes are oblong, unequal-sided, and distinctly toothed ; they are of

a parchment-like texture, with both surfaces dark green and smooth. The small sori (spore masses), placed just below the final notches, are covered with a smooth, persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 499.

N. (**Sagenia**) **melanocaulon** — Sag-e′-nĭ-a ; mel-an-oc-au′-lon (black-stemmed), *Baker.*

This stove species, native of the Philippine and Malayan Islands, produces from an ascending caudex or upright trunk fronds 1ft. to 2ft. long and 9in. to 15in. broad, which are borne on glossy, blackish stalks 1ft. or more long and scaly at the base. These fronds are broadly egg-shaped and formed of a large terminal leaflet deeply pinnatifid (cut nearly to the midrib), and from one to four lateral ones on each side, also deeply pinnatifid, with egg-shaped, pointed lobes, the lowest of which are distinctly stalked, 6in. to 12in. long, 4in. to 6in. broad, often again pinnate at the base. The texture is soft and papery, and the rachis (stalk of the leafy portion) is of a blackish colour. The numerous small and scattered sori (spore masses) are covered with a small, fringed involucre of a fugacious nature.—*Hooker*, *Species Filicum*, iv., p. 53.

N. (**Lastrea**) **membranifolium** — Las′-tre-a ; mem-bra-nif-ol′-ĭ-um (membranous-fronded). Synonymous with *N. dissectum.*

N. (**Lastrea**) **microbasis** — Las′-tre-a ; mi-crob-a′-sis (having a small base), *Baker.*

A greenhouse species, found on the banks of the Niger. Its oblong-spear-shaped fronds, about 1½ft. long and 5in. to 6in. broad, are produced from an upright trunk, borne on short, naked, grey stalks, and bipinnatifid (twice divided nearly to the midrib). The sessile, ligulate pinnæ (stalkless, strap-shaped leaflets) are of a somewhat leathery nature, pointed at their extremity, and cut down to a narrow wing into close, blunt, entire lobes, the lower ones being much reduced and deflexed (thrown back). Their rachises (stalks of the leafy portion) are densely hairy, and the lower surface of the leaflets is finely downy on the ribs. The small sori (spore masses), disposed on the midveins, are covered with a densely bristly, fugacious involucre.—*Hooker*, *Synopsis Filicum*, p. 496.

N. (Lastrea) microsorum — Las′-tre-a ; mi-cros-o′-rum (having small sori), *Hooker*.

A greenhouse species, of medium dimensions, native of Mount Chimborazo, with fronds 2ft. long, 1ft. broad, and borne on stalks 1ft. or more in length and densely scaly, especially below. The leaflets, of a soft, papery texture, are about 6in. long and cut down to the rachis (stalk) below into close, blunt lobes, on which the small and abundant sori (spore masses) are disposed midway between the edge and the midrib.—*Hooker*, *Species Filicum*, iv., p. 106.

N. (Lastrea) Milnei—Las′-tre-a ; Mil′-nĕ-i (Milne's), *Hooker*.

In this stove species, native of Fiji, and somewhat resembling *N. dissectum* in general appearance, the fronds, 1½ft. to 2ft. long, 1ft. or more broad, and somewhat deltoid (in shape of the Greek delta, Δ), are borne on naked, blackish, polished stalks 1ft. or more in length. The lowest leaflets, which are much the largest, are frequently 6in. to 9in. long and 4in. to 5in. broad ; they are divided into close, lanceolate pinnules (spear-shaped leafits), cut down throughout to a narrowly-winged rachis (stalk of the leafy portion) into narrow-oblong, deeply-cleft lobes of a somewhat leathery texture, deep green in colour, and smooth on both surfaces. The sori (spore masses) are terminal on the short lateral branches of the veins of the lobes.—*Hooker*, *Species Filicum*, iv., p. 143 ; *Second Century of Ferns*, t. 62.

N. (Eunephrodium) molle—Eu-neph-ro′-dĭ-um ; mol′-lĕ (soft), *Desvaux*.

This greenhouse species, of medium dimensions, which, on account of its free growth and prolific character, is frequently met with in cultivation, is a variable plant, with a remarkably wide range of habitat. It is found from Cuba and Mexico to Peru and Brazil, from the Himalayas and Hong-Kong to New Zealand and New South Wales, also in Madeira, the Azores, Cape Colony, the Mascarene Islands, on the Guinea Coast, &c. Its spear-shaped fronds, 1ft. to 2ft. long, 8in. to 12in. broad, and borne on tufted, somewhat slender stalks 1ft. or more in length and slightly scaly at the base, have their leaflets, 4in. to 6in. long, ¾in. broad, of a soft, papery texture and pale green colour, cut about half-way down to the midrib into narrow, blunt lobes (Fig. 132) ; the lower leaflets are placed at a little distance from each other and are rather

shorter than the others, which become more closely set as they approach the summit. The sori (spore masses) are distant from the midrib, and are covered

Fig. 132. Nephrodium molle
(⅛ nat. size).

with a very hairy involucre of a purplish colour.—*Hooker*, *Species Filicum*, iv., p. 67. *Nicholson*, *Dictionary of Gardening*, ii., p. 441. *Beddome*, *Ferns of Southern India*, t. 84. *Lowe*, *Ferns British and Exotic*, vi., t. 30.

This is a most accommodating plant, succeeding under either stove or greenhouse treatment. It does well either grown in a pot or planted out in the rockery, where it forms a capital background, showing off to advantage other and choicer Ferns, and in which position it soon multiplies, as it is readily propagated from spores. Several varieties of *N. molle* have been produced under cultivation, the most distinct being the following :

N. m. corymbiferum—cor-ymb-if′-er-um (corymb-bearing), *Moore.*

A really interesting and highly-decorative plant, of more upright habit (Fig. 133) than the species from which it originated. It produces from a single crown and in great abundance fronds 1½ft. to 2ft. long, which are repeatedly branched and furnished with singularly-contracted leaflets that are much shorter than in the species and crested at their extremity ; the summit of the frond itself is adorned with a similar crest of larger dimensions.

Fig. 133. Nephrodium molle corymbiferum, showing (1) Habit, (2) Summit of Frond, (3) Leaflet.
(1 and 2, much reduced ; 3, ⅓ nat. size.)

On account of its curious form, its rapid growth, and its pleasing green colour, this variety has taken a leading place among the Ferns specially grown for decoration. When subjected to cool or intermediate treatment it is never, to our knowledge, attacked by any insect ; it is only when grown in too warm a house that the plant is seen covered with mealy bug, which pest is only eradicated with great difficulty, as the texture of the fronds is very soft, and they do not bear fumigating or dipping in any insecticide.

N. m. grandiceps—gran′-dic-eps (large-headed), *Moore.*

In this pretty and very distinct variety, also of garden origin, the fronds bear at their summit a large, terminal crest, and the extremities of their leaflets are also conspicuously crested (Fig. 134).—*Nicholson, Dictionary of Gardening*, ii., p. 442.

N. (Lastrea) montanum — Las′-tre-a ; mon-ta′-num (Mountain Buckler Fern), *Baker.*

This interesting, hardy species, also known under the name of *Lastrea Oreopteris*, though not indigenous in any other part of the world, is found in France, Switzerland, and in the centre of Europe in considerable quantities. It is widely spread through the United Kingdom, being exceedingly common in Scotland and the North of England, where it ranges from the sea-level to an altitude of 3000ft. Ray, who first mentions it as a native of this country, referring to it in the Appendix to the Second Edition of his "Synopsis Methodica Stirpium Britannicarum," gives it as "a variety of the common Male Fern, observed by Petiver on Dunsmore Heath, near Rugby, in the County of Warwick." It was eventually found in many parts of the British Islands, notably at Old Foot's Well, Bromsgrove, in Worcestershire ; near Chapel Weardale and Darlington, in Durham ; in the woods of Castle Howard, in Yorkshire ; at Conham and Leigh Woods, near Bristol, in Somersetshire ; on Bailey's Hill, between Brasted and Tunbridge, in Kent ; near Southampton, &c. In the Lake District of Westmoreland and Cumberland it is very abundant. It has been gathered in Wales, near Wrexham, in Denbighshire, and at Llanberis and Nant Gwynedd, in Carnarvonshire, and has been reported from various parts of Scotland and Ireland. As its name implies, the Mountain Buckler Fern is usually found growing upon mountain heaths, but it is also an inhabitant of shady woods where the soil is moist, without, however, being uniformly wet.

Fig. 134. Portion of Frond of Nephrodium molle grandiceps (½ nat. size).

The spear-shaped fronds of this species, produced from a dense, clustered crown, and borne on short, tufted stalks furnished at their base with chaffy scales of a light brown colour, are 1½ft. to 2ft. long, 6in. to 8in. broad, and

furnished with leaflets 3in. to 4in. long, 1in. broad at the base, of a soft, papery texture, and of a brilliant green colour. These leaflets are cut down to a broadly-winged stalk into close, oblong, blunt lobes, the lower ones, distantly placed, being gradually dwarfed to mere auricles. The round and moderate-sized sori (spore masses) are disposed in rows near the edge of the lobes, and covered with a thin involucre of a peculiarly white colour.—*Hooker*, *Species Filicum*, iv., p. 90 ; *British Ferns*, t. 14. *Nicholson*, *Dictionary of Gardening*, ii., p. 442. *Lowe*, *Ferns British and Exotic*, vi., t. 17. *Correvon*, *Les Fougères Rustiques*, p. 133.

The Mountain Buckler Fern is most effective when planted in masses on the rockery ; but it is one of the few species which do not take to transplanting very kindly, although, with a little care, it may successfully be removed. It also makes a handsome specimen when grown in a pot ; in either case thorough drainage is necessary, and the soil best suited to its cultivation is a compost of four parts of fibry peat and one part each of leaf mould and sandy loam, with a free admixture of silver sand.

Though *N. montanum* is one of the least variable of the British Ferns, it has produced a few varieties, some of which have been considered of sufficient importance to occupy a permanent place in collections, and to deserve the careful attention of the late Thomas Moore, who named and described most of them. The following are the most distinct forms :

N. m. caudatum—cau-da′-tum (tailed), *Moore.*

This variety, of normal size, but very distinct in appearance, originally found at Windermere, has remained permanent under cultivation. In some respects it is normal, but it differs in its leaflets, variable in length and 6in. broad at the base, being narrowed and drawn out to a considerable length, and furnished with rounded leafits. The extremity of the fronds is frequently three times divided.—*Lowe*, *Our Native Ferns*, i., fig. 179.

N. m. crispum—cris′-pum (curled), *Moore.*

A variety originally found on the Clova Mountains. It is normal in outline and size, but differs essentially from the species in having its pinnules (leafits) undulated, so that the frond has a crispy appearance.—*Lowe*, *Our Native Ferns*, i., fig. 175.

N. m. cristatum—cris-ta′-tum (crested), *Moore.*

The fronds of this variety, which was originally found in Monmouthshire, are somewhat smaller than those of the normal form, and terminate in corymbs (agglomerations) of a leafy nature. The extremities of the leaflets are also much crested and crisped, although not to such a degree as the summit of the frond.—*Lowe*, *Our Native Ferns*, i., fig. 174. *Nicholson*, *Dictionary of Gardening*, ii., p. 442.

N. m. Nowellianum—Now-el-lĭ-a′-num (Nowell's), *Moore.*

This form of the Mountain Buckler Fern—by far the most extraordinary hitherto discovered—is as interesting as it is distinct. It was originally found near Lake Gyrionedd, in North Wales, and has proved constant under cultivation ; it is of so remarkable a character that anyone only moderately acquainted with the genus would be puzzled to say to which species it is related, as it shows so very little of the character of the typical plant. The fronds, which vary from 1½ft. to 2ft. in length and from 4in. to 6in. in breadth, are pinnate (divided to the midrib), being furnished with very narrow leaflets, and terminate much more abruptly than in the normal species ; their pinnules (leafits) are extremely short, deeply cut and serrated, often curiously hooked and horned. The sori (spore masses) are very conspicuous.—*Lowe*, *Our Native Ferns*, i., fig. 176. *Nicholson*, *Dictionary of Gardening*, ii., p. 442.

N. m. truncatum—trun-ca′-tum (maimed, bitten off), *Moore.*

This very curious variety, which was found near Tunbridge Wells and also at Llanberis, Carnarvonshire, possesses a peculiar appearance owing to the extremities of all the leaflets of its fronds terminating abruptly, appearing as if eaten off in a uniform manner by some insect. The extremity of the rachis (stalk of the leafy portion) frequently projects ¼in. beyond the pinnules (leafits). In all other respects this plant is normal.—*Lowe*, *Our Native Ferns*, i., fig. 176.

N. (Eunephrodium) multijugum—Eu-neph-ro′-dĭ-um ; mul-tij′-ug-um (having many pairs of leafits), *Baker.*

A stove species, of large dimensions, native of the Malayan Peninsula. Its ample fronds, 3ft. to 4ft. long, 1ft. to 1¼ft. broad, and borne on strong,

upright, nearly smooth stalks 1ft. to 2ft. long, are furnished with leaflets 6in. to 8in. long, cut two-thirds of the way down to the rachis (stalk of the leafy portion) into close, sharply-pointed, nearly sickle-shaped lobes of a somewhat leathery texture and bright green colour. The sori (spore masses) are disposed near the midrib.—*Hooker*, *Synopsis Filicum*, p. 291.

N. (Lastrea) Napoleonis—Las′-tre-a ; Nap-o-le-o′-nis (Napoleon's), *Bory*.

This singular and thoroughly distinct, greenhouse species, limited to the Island of St. Helena, is of medium size. Its shortly-triangular fronds are 1ft. to 1½ft. long and 8in. to 12in. broad, and are borne on stalks 6in. to 12in. long, densely scaly at the base and naked upwards. The lowest leaflets are much the largest. The pinnules (leafits) of the under-side, which are the longest, are narrowly spear-shaped, closely set, and cut down nearly to the rachis (stalk) into slightly-toothed, broad, blunt lobes of a somewhat leathery texture. The sori (spore masses), disposed close to the midrib, are covered with a smooth, naked involucre.—*Hooker*, *Species Filicum*, iv., p. 123, t. 255.

N. (Eunephrodium) nevadense — Eu-neph-ro′-dĭ-um ; nev-a-den′-sĕ (from Nevada), *Eaton*.

This very interesting, greenhouse species, which in North America is known by the popular name of "Sierra Shield Fern," is, according to Eaton, found in moist meadows and along creeks in the Sierra Nevada, North California, especially in a meadow containing also the Swamp-loving Darlingtonia, near Quincy, Plumas County, and in Berry Creek Cañon, Butte County. Its spear-shaped fronds, produced from a creeping rhizome (prostrate stem), are 1½ft. to 3ft. long, including their short stalks, the lower part of which, and the rhizome or rootstock, bear a few chaffy scales. These fronds are of a thin, papery texture and pale green colour. The sori (spore masses), situated close to the margin of the leaflets, are covered with a minute, kidney-shaped indusium, furnished with a few dark-coloured, marginal glands, and bearing several long, straight, jointed hairs on the upper surface. An important feature to be observed in the fertile fronds, and which has not been noticed in any other Fern, is that the divisions of the leaflets are closed or folded together in the early part of the day, and only open in the afternoon.

In his excellent work, "Ferns of North America," vol. i., p. 74, Eaton, referring to this peculiar character, says that Mrs. Austin, to whom he is indebted for a complete series of fine specimens of Ferns of Plumas County, California, is the first person who noticed it. When writing to him on the subject, she said: "I noticed this last fall when I went early (while it was yet cool) in the morning for specimens for the press. I would not gather them as I did not think they would make nice specimens, but went further up the creek, collecting other plants, and did not return till two or three o'clock, when I found the pinnæ all open and the fronds fit to press." Some subsequent observations confirmed her in the opinion that this Fern at least has its daily periods of contraction and expansion; but whether the change is caused by alternation of light and darkness, dampness and dryness, or heat and cold, is yet undetermined.—*Eaton, Ferns of North America*, i., t. 10.

N. (Sagenia) nigrescens—Sag-e′-nĭ-a; nig-res′-cens (blackish), *Baker.*

A stove species, of medium dimensions, native of Upper Guinea, with fronds 1½ft. to 2ft. each way, deltoid (in shape of the Greek delta, Δ), tripinnatifid (three times divided nearly to the midrib), and borne on grey stalks 1ft. to 2ft. long. The leafy portion, of a parchment-like texture, is nearly smooth and of a dark green colour. The moderately large and irregular sori (spore masses) are disposed in series between the midrib and the edge of the final lobes.—*Hooker, Synopsis Filicum*, p. 504.

N. (Lastrea) noveboracense—Las′-tre-a; nov-eb-or-ac-en′-sĕ (native of New York), *Desvaux.*

This interesting, greenhouse species, which in America is known under the popular name of "New York Shield Fern," is found abundantly in moist thickets and wet, grassy places in North America, principally from New Brunswick and Canada to Virginia, also in Ohio, Kentucky, and North Carolina. It is peculiarly distinct on account of the very slender character of its underground-creeping rhizome (prostrate stem), which always keeps several inches in advance of the developed fronds, and the youngest portion of which is singularly downy. The spear-shaped fronds, 1ft. to 2ft. long, 4in. to 6in. broad, and borne on slender stalks about 1ft. long, are furnished with spreading leaflets 2in. to 3in. long, cut down very nearly to the midrib into

narrow-oblong lobes, which are broadest in the barren fronds; the lower leaflets are smaller and deflexed (thrown back), and all are of a soft, papery texture. The sori (spore masses) are disposed in rows near the margin of the lobes.—*Hooker*, *Species Filicum*, iv., p. 89. *Nicholson*, *Dictionary of Gardening*, ii., p. 442. *Eaton*, *Ferns of North America*, i., t. 7.

There exists a variety which is generally imported from Essex County, New York, and which differs from the above species only in the sweet and agreeable odour emitted by its slightly more rigid and narrower fronds. Eaton states that a few plants of it, dried in the open air, will perfume a room deliciously for a long time.

N. (Lastrea) obtusilobum — Las′-tre-a; ob-tu-sil′-ob-um (blunt-lobed), *Baker.*

A stove species, of large dimensions, native of Ceylon, with fronds 3ft. to 4ft. long and 1½ft. to 2ft. broad, borne on firm, upright stalks that are 1ft. to 2ft. long and densely clothed with large, egg-shaped, light-coloured scales. The lower leaflets are frequently 1ft. long and 6in. broad, and their pinnules (leafits), cut down to the midrib into oblong, entire lobes, are of a soft, papery texture, with their under-surface more or less glandular. The sori (spore masses) are disposed along the midvein.—*Hooker*, *Synopsis Filicum*, p. 284. *Beddome*, *Ferns of British India*, t. 296.

N. (Lastrea) odoratum—Las′-tre-a; od-o-ra′-tum (fragrant), *Baker.*

This very interesting, comparatively small, greenhouse species, also known as *N. eriocarpum* of Decaisne and *N. hirsutum* of Don, has a very wide range of habitat. It is said to be found at elevations of between 7000ft. and 8000ft. in Northern India, whereas Beddome, in "Ferns of Southern India," says it is found on the Peringoonda Hill, in the Anamallays, at an altitude of 5000ft.; it is also a native of South China, the Malayan Peninsula, Mauritius, &c. This Fern has a very peculiar appearance, produced by the stout, ascending stem from which the fronds rise, and which, like that of the common Cushion Fern (*Dicksonia Culcita*), is provided with a thickness of about 2in. of scales, nearly 1in. long and of a beautiful golden colour. The stalks, densely clothed at their bases with similar scales, are 1ft. to 1½ft. long. The leafy portion is deltoid (in shape of the Greek delta, Δ), from 9in. to 18in. each way, and

tripinnate (three times divided to the midrib), the lowest leaflets being much the largest (Fig. 135, reduced from Col. Beddome's "Ferns of Southern India," by the kind permission of the author). The pinnules (leafits) are spear-shaped, often imbricated (overlapping), and have blunt, rounded lobes; they are of a soft, papery texture and pale green colour, and are hairy on both sides. The abundant and conspicuous sori (spore masses) are covered with a large, pale, hairy involucre. This species is of very good and compact habit, but requires very careful watering during the winter.—*Hooker*, *Species Filicum*, iv., p. 141. *Nicholson*, *Dictionary of Gardening*, ii., p. 442. *Beddome*, *Ferns of Southern India*, t. 95.

Fig. 135. Nephrodium odoratum (much reduced).

N. (Lastrea) opacum—Las′-tre-a; op-a′-cum (opaque).

This garden name, for which we cannot find any authority, is applied to a plant having the appearance of a thick-leaved, dull form of the popular *N. erythrosorum*, and said, like that species, to be a native of Japan. Its fronds, however, never show, even in their young state, the beautiful tints which form the principal ornament of *N. erythrosorum;* yet it is a most useful Fern, as its foliage is rarely affected by gas, smoke, or London fog.

N. (Lastrea) Oreopteris — Las′-tre-a; Or-ĕ-op′-ter-is (Mountain Fern). Synonymous with *N. montanum.*

N. (Eunephrodium) Otaria — Eu-neph-ro′-dĭ-um; O-ta′-rĭ-a (Otaria), *Baker.*

This very useful, greenhouse species, better known in gardens as *Lastrea aristata*, although usually considered of Japanese origin, is also a native of the Philippines, the Neilgherries, and Ceylon. Its beautiful fronds, of a very

robust nature, are produced from a thick, fleshy, underground rhizome (prostrate stem), which delights in finding its way in any material of a rough or coarse nature—peat, partly-decayed vegetable matter, or even partly-decomposed moss; they are borne on stalks 6in. to 12in. long and of a scaly nature, and their leafy portion usually measures 1ft. or more in length. The terminal leaflet is 4in. to 6in. long, 1in. to 1½in. broad, and sharply pointed at its extremity, and it shows on both sides finely-toothed lobes reaching about a quarter of the way down to the midrib; there are also from three to six spreading, lateral leaflets on each side of the frond, the lower ones being distinctly stalked. The texture is leathery, and the colour a bright, shining green. This is a very ornamental and exceedingly useful plant, to which a certain character of distinctness is imparted by its large, conspicuous, closely-set sori (spore masses), which cover nearly the whole under-side of the fronds.—*Hooker*, *Species Filicum*, iv., p. 62, t. 238. *Nicholson*, *Dictionary of Gardening*, ii., p. 442.

The plant known in commerce as *Lastrea aristata variegata*, though usually considered as a form of this species, is undoubtedly a variety of *Aspidium aristatum*, and is described as such at p. 444, Vol. I.

N. (Eunephrodium) pallidivenium—Eu-neph-ro′-dĭ-um; pal-lid-iv-e′-nĭ-um (pale-veined), *Baker*.

A stove species, of somewhat large dimensions, native of the Guinea Coast, and gathered in the Livingstone Expedition on the shores of Lake Nyassa. Its rigid fronds, 2ft. to 3ft. long, 8in. to 12in. broad, and borne on naked stalks 1ft. or more long, are furnished with leaflets 4in. to 6in. long, about 1in. broad, and cut two-thirds of the way down to the rachis (stalk) into somewhat sickle-shaped, deeply-cut, closely-set lobes. The lower leaflets are not much smaller than the others, and all are of a leathery texture. The small and abundant sori (spore masses) are disposed in close rows about midway between the midrib and the edge.—*Hooker*, *Species Filicum*, v., p. 8. *Nicholson*, *Dictionary of Gardening*, ii., p. 442.

N. (Lastrea) palustre—Las′-tre-a; pal-us′-trĕ (marsh-loving), *Baker*.

This greenhouse species, native of Brazil, in general habit greatly resembles *N. montanum*, but is of much larger dimensions. Its fronds,

occasionally as much as 3ft. long and 1ft. broad, are borne on naked, straw-coloured stalks fully 1ft. in length; the lobes of their closely-set pinnæ (leaflets) are narrower than in *N. Montanum*, and the sori (spore masses), which fill up the greater part of the space between the midrib and the edge, are covered with small, ciliated involucres. — *Hooker*, *Synopsis Filicum*, p. 270. *Nicholson*, *Dictionary of Gardening*, ii., p. 442.

N. (Lastrea) Parishii — Las′-tre-a; Par-ish′-ĭ-i (Rev. C. S. Parish's), *Hooker.*

A very distinct, stove species, of comparatively small dimensions, native of Moulmein, where it is said to grow on limestone rocks in shady, moist places. Its fronds, borne on slender, naked stalks 6in. to 9in. long, are

Fig. 136. Frond of Nephrodium Parishii
(¼ nat. size).

deltoid (in shape of the Greek delta, Δ), 6in. to 8in. each way, their lower leaflets being much the largest (Fig. 136, reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author). The pinnules (leafits), oblong-spear-shaped, 1½in. to 2in. long, and ½in. to ¾in. broad, are cut down nearly to the rachis (stalk of the leafy portion) into close, crenated (notched) lobes of a parchment-like texture. The sori (spore masses) are disposed in rows not far from the midrib.—*Hooker*, *Species Filicum*, iv., p. 131, t. 260. *Beddome*, *Ferns of British India*, t. 43.

N. (Lastrea) patens—Las′-tre-a ; pat′-ens (spreading), *Desvaux.*

This extremely ornamental, greenhouse species has a very extensive range of habitat. In North America, where it is commonly called the "Spreading Wood Fern," it is found from Florida to South Carolina, westward near the Gulf of Mexico to Alabama, Louisiana, and Texas, also in several cañons near Santa Barbara, California. In all these places, Eaton (vol. ii., p. 182) states, it grows in low, shady woods ; he also says that it is a common Fern throughout Tropical America, and that plants not distinguishable from it are found in South Africa, and in the Islands of the Pacific Ocean. *N. patens* is likewise found in Polynesia, Japan, Angola, &c. The fronds vary very much in size, according to the habitat, the largest fronds of the North American species seldom being more than 2ft. in length and 10in. in breadth ; they are borne on roundish, pale green stalks, which also vary from a few inches to sometimes 1ft. in length, and which emerge from an oblique rootstock of a chaffy nature. The texture of the fronds is thin, but firm. The leaflets, 4in. to 9in. long and ½in. to ¾in. broad, are cut down about three-quarters of the way to the rachis (stalk) into narrow-oblong, nearly sickle-shaped lobes, both surfaces of which are pubescent with fine, white, sharp-pointed hairs. The rather small though conspicuous sori (spore masses) are disposed sometimes nearer the margin than the midrib, and furnished with a roundish or kidney-shaped, persistent involucre, covered with hairs like those of the frond.—*Hooker*, *Species Filicum*, iv., p. 95. *Nicholson*, *Dictionary of Gardening*, ii., p. 442. *Eaton*, *Ferns of North America*, ii., t. 70.

There is a form known in gardens as *N.* (*Lastrea*) *p. superbum*, for which name we cannot find any authority. This variety, which is said to have originated among some seedlings raised in the Gardens of the Royal Horticultural Society, at Chiswick, has its fronds more deeply cleft and far surpasses in elegance the species from which it is issue.

N. (Lastrea) patulum—Las′-tre-a ; pat′-ul-um (slightly spreading), *Baker.*

A stove species, with a habitat ranging from the West Indies and Mexico to Brazil and Ecuador. Its broadly-spear-shaped fronds, 1ft. to 2ft. long and 6in. to 12in. broad, are borne on tufted stalks 1ft. to 1½ft. long, scaly towards the base. The spear-shaped leaflets, 3in. to 6in. long and 1½in. to 2in. broad,

have their divisions sometimes spathulate (spoon-shaped) and not cut down quite to the midrib ; they are of a thin yet firm texture, pale green in colour, and naked on both surfaces. The sori (spore masses), which are disposed in rows, are situated about midway between the edge and the midrib, and are covered with a conspicuous, naked involucre.—*Hooker*, *Species Filicum*, iv., p. 138, t. 267.

N. (Lastrea) pedatum—Las′-tre-a ; ped-a′-tum (foot-like), *Hooker.*

A stove species, of small dimensions, native of the West Indies, with fronds 3in. to 4in. each way, deeply cleft, and borne on tufted, glossy stalks 4in. to 6in. long. The foliage, of a leathery texture, is naked on both sides, and the large and conspicuous sori (spore masses) are disposed in rows near the main veins.—*Hooker*, *Species Filicum*, iv., p. 84.

N. (Eunephrodium) pennigerum—Eu-neph-ro′-dĭ-um ; pen-nig′-er-um (winged), *Hooker.*

This stove species, of large dimensions, is a native of the Himalayas, Ceylon, the Malaccas, Johanna Island, Angola, and the Guinea Coast ; according to Beddome, it is also found on the Neilgherries and Anamallay Mountains, in the Sisparah and Carcoor Ghats. Its fronds, 2ft. to 4ft. long, 1ft. to 1½ft. broad, are borne on stout, tufted, finely-hairy stalks 8in. to 12in. long. The numerous leaflets, 6in. to 9in. long, have their edge cut about a quarter of the way down to the midrib into oblong-sickle-shaped lobes of a somewhat soft, papery texture, and the sori (spore masses) are disposed along the midvein. *N. articulatum* is another name for this species.—*Hooker*, *Species Filicum*, iv., p. 82. *Nicholson*, *Dictionary of Gardening*, ii., p. 442.

N. pilosissimum—pil-o-sis′-sim-um (very pilose). This is a synonym of *N. subquinquefidum.*

N. (Lastrea) platypus—Las′-tre-a ; plat′-yp-us (flat-footed), *Hooker.*

This doubtful, stove species, of medium dimensions, native of Java and the Moulmein Mountains (where, according to Beddome, it grows at 5000ft. elevation), much resembles *Aspidium aristatum*, but its sori (spore masses) are covered with a large, distinctly kidney-shaped involucre.—*Hooker*, *Species Filicum*, iv., p. 149. *Beddome*, *Ferns of British India*, t. 228.

N. (Lastrea) podophyllum — Las′-tre-a ; pod-oph-yl′-lum (footstalk-fronded), *Hooker.*

A singular, greenhouse species, native of Japan and China, much in the way of the more popular *N. Sieboldii*, having, like that species, a distinct terminal leaflet similar to the lateral ones.—*Hooker*, *Species Filicum*, iv., p. 87. *Nicholson*, *Dictionary of Gardening*, ii., p. 442.

N. (Sagenia) polymorphum—Sag-e′-nĭ-a ; pol-ym-orph′-um (of many forms), *Baker.*

This is a variable, stove species, native of Ceylon, the Malayan Peninsula and Islands, and the Himalayas, where it is said to occur up to 4000ft. elevation. Its fronds, 2ft. to 4ft. long, 1ft. to 1½ft. broad, and borne on brownish, naked stalks 1ft. or more in length, are produced from a creeping rhizome (prostrate stem). They are composed of a terminal leaflet and from two to six pairs of lateral ones, all large, oblong in shape, variously forked, especially the lower ones, and of a leathery texture, the principal veins being distinct to the edge. The small, abundant, scattered sori (spore masses) are disposed on the connected veinlets.—*Hooker*, *Species Filicum*, iv., p. 54.

N. (Lastrea) Prenticei—Las′-tre-a ; Pren-tic′-e-i (Prentice's), *Baker.*

A species of small dimensions and of little decorative value, with fronds about 1ft. long, bright green on both surfaces. The sori (spore masses) are disposed along the midvein, and covered with a small, smooth, persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 494.

N. (Lastrea) Preslii—Las′-tre-a ; Presl′-ĭ-i (Presl's), *Baker.*

A stove species, of small dimensions, in general appearance resembling a small form of *N. dissectum*, but of a thicker texture, and with the sori (spore masses) disposed close to the base of the obscure veinlets.—*Hooker*, *Synopsis Filicum*, p. 272.

N. (Eunephrodium) procerum—Eu-neph-ro′-dĭ-um ; pro-ce′-rum (tall), *Baker.*

A stove species, native of Bourbon Island. It produces oblong-spear-shaped fronds 2ft. to 3ft. long, 1ft. to 1½ft. broad, bipinnatifid (twice divided

nearly to the midrib), and borne on stalks of a slightly downy nature. The sessile pinnæ (stalkless leaflets) are strap-shaped and sharply pointed, the central ones, which are the largest, being from 6in. to 9in. long and ¾in. broad; all are cut down to a broad wing into sickle-shaped lobes of a rigidly-leathery texture, smooth on both surfaces, and with ribs finely hairy. The minute sori (spore masses) are disposed along the midvein, and are covered with a smooth involucre of a persistent nature.—*Hooker*, *Synopsis Filicum*, p. 502.

N. (Lastrea) prolificum—Las′-tre-a; pro-lif′-ic-um (prolific), *Moore.*

This greenhouse or even hardy species—one of the most interesting of the many Ferns introduced from Japan—is of comparatively small dimensions. Its fronds, which are produced from a succulent crown showing very little above the surface of the ground, and borne on green, wiry stalks 6in. to 9in. long, are of a somewhat elongated-triangular form, seldom exceed 1ft. in length, and are tripinnate (three times divided to the midrib). The numerous leaflets and their sub-divisions, of a leathery texture and shining dark green colour, being set far apart, give the whole plant an elegant appearance. A very singular character peculiar to this species is that it produces, either in the axils of the leaflets or, less frequently, on the margins of their lobes, innumerable leafy buds, by which it is easily and rapidly propagated. The abundance of the sori and their colour are also very characteristic, for the under-side of the lobes is entirely covered with conspicuous spore masses of a beautiful red when young, turning later on to a deep purple colour, as in *N. erythrosorum*, to which species the present plant appears to be related. It is undoubtedly a most distinct Fern, deserving a place in every good collection, for, on account of its peculiarity as well as its elegance, it never fails to prove a subject of great attraction.—*Nicholson*, *Dictionary of Gardening*, iv., p. 573.

N. propinquum—prop-in′-qŭ-um (allied), *Wollaston.*

This is the *Lastrea Filix-mas abbreviata* of Babington and Moore, which Mr. Wollaston ranks as a species, on account of its more compact habit, more beautiful outline, and thoroughly deciduous character.—*Lowe*, *Our Native Ferns*, i., pp. 234, 235, and 280.

N. pseudo-mas—pseu′-do-mas (false Male Fern), *Wollaston.*

A form of the common *Filix-mas*, from which it differs through its fronds being of larger dimensions and of a more leathery texture; they are also said to possess an evergreen character. Mr. Wollaston ranks this variety as a distinct species.—*Lowe*, *Our Native Ferns*, i., pp. 234 and 237.

N. (Eunephrodium) pteroides — Eu-neph-ro′-dĭ-um; pter-ŏ-i′-des (Pteris-like), *J. Smith.*

This stove species, of large dimensions, better known in garden collections as *N. terminans*, possesses a very wide range of habitat, being found in China and Queensland, also in the Malayan and Philippine Islands, in Ceylon, and on the Himalayas, the Neilgherries, and the Anamallays, where, according to Beddome, it occurs in moist forests and outskirts of Sholas at between 2000ft. and 4000ft. elevation. The simply-pinnate fronds, 2ft. to 4ft. long, 1ft. or more broad, and borne on slender, greyish stalks 1ft. to 2ft. long and slightly scaly below, are furnished with deeply-lobed leaflets of a soft, papery texture and bright green colour. The sori (spore masses) are disposed only along the margins of the lobes.—*Hooker*, *Species Filicum*, iv., p. 73. *Nicholson*, *Dictionary of Gardening*, ii., p. 442. *Lowe*, *Ferns British and Exotic*, vi., p. 44. *Beddome*, *Ferns of Southern India*, t. 90.

N. (Lastrea) pubescens—Las′-tre-a; pu-bes′-cens (downy), *Desvaux.*

A very handsome, evergreen, stove species, native of the West Indies, and one which, in general appearance, somewhat resembles the better-known *N. decompositum.* Its fronds, produced from a wide-creeping rhizome (prostrate stem), and borne on slender stalks 6in. to 12in. long, are deltoid (in shape of the Greek delta, Δ), 6in. to 18in. long, with lower leaflets much the largest. The sharply-toothed segments are unequal-sided, being largest on the upper side, and of a somewhat leathery texture. The sori (spore masses), small and distant from the midrib, are of a very pale straw-colour when in a young state, becoming pale green with age.—*Hooker*, *Species Filicum*, iv., p. 146. *Hooker and Greville*, *Icones Filicum*, t. 102. *Lowe*, *Ferns British and Exotic*, vi., t. 25.

N. (Lastrea) pumilum—Las′-tre-a; pu′-mil-um (dwarf). A variety of *N. Filix-mas.*

N. (Eunephrodium) punctatum — Eu-neph-ro′-dĭ-um ; punc-ta′-tum (dotted), *Parish.*

A greenhouse species, of medium dimensions, native of Moulmein, where, according to the Rev. C. S. Parish, it is found in deep jungles. Its oblong-spear-shaped fronds, 2ft. to 3ft. long and produced from a creeping rhizome (prostrate stem), are furnished with sessile pinnæ (stalkless leaflets) of a parchment-like texture and cut down to a broad wing into sickle-shaped lobes, along the margins of which the sori (spore masses) are disposed.—*Hooker*, *Synopsis Filicum*, p. 503. *Beddome*, *Ferns of British India*, t. 131.

N. punctilobulum—punc-til-ob′-ul-um (having dotted lobes). A synonym of *Dicksonia punctiloba.*

N. (Lastrea) purpurascens — Las′-tre-a ; pur-pur-as′-cens (purplish). Synonymous with *N. sparsum.*

N. (Lastrea) Raddianum—Las′-tre-a ; Rad-dĭ-a′-num (Raddi's). This is a synonym of *N. vestitum.*

N. (Lastrea) recedens—Las′-tre-a ; rec-e′-dens (receding), *Hooker.*

This stove species, of medium dimensions, native of the Philippines, Ceylon, and the Neilgherries (where, according to Beddome, it occurs at 4000ft. elevation), is very rare in cultivation. It is a thoroughly distinct-habited Fern, with fronds 1½ft. to 2ft. long, 1ft. or more broad, and deltoid (in shape of the Greek delta, Δ) ; they are borne on erect stalks 1ft. long, clothed with soft, woolly scales. The lower leaflets, 6in. to 12in. long and 3in. to 6in. broad, have their pinnules (leafits) often 6in. long, 2in. broad, divided into distinct, one-sided, spear-shaped segments, and close, slightly-toothed lobes, all being of a parchment-like texture, more or less woolly underneath, but quite smooth on the upper surface. The sori (spore masses) are disposed six to eight round the edge of the larger lobes.—*Hooker*, *Species Filicum*, iv., p. 135, t. 265. *Beddome*, *Ferns of Southern India*, t. 98.

N. (Lastrea) recurvum — Las′-tre-a ; rec-ur′-vum (recurved). This is synonymous with *N. æmulum.*

N. (Eunephrodium) refractum — Eu-neph-ro′-dĭ-um ; ref-rac′-tum (curved back), *Hooker*.

A greenhouse species, native of Brazil. It is well marked by its peculiar habit and by the bright green colour of its fronds, which are 1ft. to 1½ft. long, 6in. to 9in. broad, and borne on naked stalks 1ft. long and of a glossy nature. The leaflets grow gradually smaller, from near the bottom to the top ; the lower ones, 4in. to 5in. long and ¾in. broad, are deflexed, and the lowest pairs very much so, their broad and blunt lobes reaching about a quarter of the way down to the midrib. The fronds are of a soft, papery texture and bright green colour, and are smooth on both surfaces. The sori (spore masses), disposed along the midvein, are covered with a minute, fugacious involucre.—*Hooker*, *Species Filicum*, iv., p. 162, t. 252. *Nicholson*, *Dictionary of Gardening*, ii., p. 442.

N. (Lastrea) remotum—Las′-tre-a ; rem-o′-tum (distant), *R. Braun*.

This handsome Fern, which, in Hooker's "British Ferns" (t. 22), is figured and given as a variety of *N. spinulosum*, was first discovered in the summer of 1859, in Westmoreland, by Mr. F. Clowes, of Windermere, who himself looked upon it as a form of *N. spinulosum*, and sent some fronds to Mr. Thomas Moore, of the Chelsea Botanic Gardens. This well-known authority on Ferns recognised it as *Aspidium remotum* of Braun, and announced the discovery of this British species at a meeting of the Linnean Society on the 15th December, 1859. It is a plant of deciduous character, with oblong-spear-shaped fronds, 2ft. long, 6in. broad, and of upright habit. The leaflets, usually opposite and spear-shaped, are closely set, and their pinnules (leafits), about 1¼in. long and shortly stalked, are cut half-way down to the midrib, or more, and distinctly toothed, more especially towards the extremity. The somewhat conspicuous sori (spore masses) are disposed in two rows near the midvein, and are covered with a kidney-shaped indusium of a persistent nature.—*Lowe*, *New and Rare Ferns*, t. 22. *Correvon*, *Les Fougères rustiques*, p. 142.

N. (Lastrea) Richardsi—Las′-tre-a ; Rich-ards′-i (Richards'), *Baker*.

A stove species, native of New Caledonia. It is of little decorative value, of medium dimensions only, and has fronds of a parchment-like texture. The

sori (spore masses), disposed along the midvein, are covered with a firm, slightly hairy, persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 494. *Nicholson*, *Dictionary of Gardening*, ii., p. 443.

N. R. multifidum—mul-tif′-id-um (much cleft), *Moore*.

This variety, also known on the Continent under the name of *Aspidium Germinyi*, is no doubt one of the handsomest of all Ferns, although it has sprung from a typical form, native of New Caledonia, which, probably on account of its weedy appearance, has never been much in cultivation. In this exceedingly ornamental variety, the fronds differ from those of the typical plant in having their extremities, as well as those of the leaflets, cleft into numerous narrow, pointed, spreading, finger-like lobes. Its fronds, which are produced in great abundance from a short, succulent, decumbent stem, measure about 2ft. in length and 8in. in breadth at their widest part; they are borne on round stalks 10in. to 15in. long, of a pale green colour, and slightly downy when young. The leaflets, which are upwards of 4in. long in the broadest part of the frond, terminate in a dense tuft of long, narrow divisions, the extremity of the fronds being also divided into two or more branches consisting of numerous thread-like segments. The singular and elegant character of this useful plant is enhanced by its bright green colour and the arching habit of its fronds (see Plate). It possesses the faculty of reproducing itself true from spores.—*Nicholson*, *Dictionary of Gardening*, iv., p. 573.

N. (Lastrea) rigidum—Las′-tre-a; rig′-id-um (rigid), *Desvaux*.

This hardy species, of medium dimensions, has a very wide range of habitat. Besides being found in Algeria, Tunis, Syria, Asia Minor, and California, it is also a native of various parts of Europe, and occurs in several localities in England, where it is commonly known as the "Rigid Buckler Fern," and is almost confined to the limestone mountains of the North, ranging, as Mr. Moore remarks, between 1200ft. and 1500ft. above the sea-level. Its notice as a British species dates from 1815, when it was first discovered at Ingleborough by the Rev. Mr. Bree. It was subsequently found at Whornside; at Settle; at Arnside Knot (near Silverdale), in Westmoreland; and on White Scars, above Ingleborough. Later still, a single plant of it

was found at Bath, and another at Louth, in Ireland; but in such situations as to justify the opinion that these were introductions. Its oblong-spear-shaped fronds, 1ft. to 1½ft. long and 4in. to 6in. broad, are borne on tufted stalks 6in. long and clothed below with large, spear-shaped, light brown scales. The largest leaflets, 2in. to 3in. long and 1in. to 1½in. broad, have their leafits (pinnules) cut down nearly to the rachis (Fig. 137). The fronds are of soft texture and upright habit, with their under-side slightly glandular. The abundant sori (spore masses) are situated close to the midrib, and are covered with a firm, prominent involucre fringed with glands.—*Hooker*, *Species Filicum*, iv., p. 160; *British Ferns*, t. 16. *Nicholson*, *Dictionary of Gardening*, ii., p. 443. *Lowe*, *Ferns British and Exotic*, vi., t. 21. *Eaton*, *Ferns of North America*, ii., t. 46. *Correvon*, *Les Fougères rustiques*, p. 138.

Fig. 137. Frond of Nephrodium rigidum
(⅓ nat. size).

Under cultivation, *N. rigidum* is a free-growing species, and the fact of its being found growing wild generally upon chalky soils shows that by its natural habit it is well adapted for planting on artificial rockwork. Correvon, in his excellent work, "Les Fougères rustiques," states that, although on the Jura Mountains and on the Alps, the leafy parts of the plant are developed in full sun and under the influence of a warm and dry atmosphere, its rhizome (prostrate stem) and roots usually penetrate to a great depth through pebbles and limestone, where they remain in a permanent state of moisture.

Eaton, in his exhaustive work on "Ferns of North America," mentions (vol. ii., p. 4) two distinct forms of this species, viz., *N. r. pallidum* of Link, found in the South of Europe, a variety with fronds less sharply toothed and

of a much lighter colour than those of the typical plant; and *N. r. argutum* of Kaulfuss, which is essentially a North American plant, found growing wild on rocky hillsides and cañons, often in copses, from Oregon and California to the Sierra Madre of North-Western Mexico. Eaton further states that the latter variety is one of the commonest Ferns of California, where it is known as the "Rigid Wood Fern," but most abundant west of the Coast Range, though occurring as far east as Plumas County. By the same authority it is also stated that this variety has larger and broader fronds than the European *N. rigidum*, but that it certainly presents no points of specific distinction, and that "some of the Oregon specimens, collected near the Willamette River, are so nearly typical *rigidum*, that they would not be challenged if mixed among European specimens."—*Eaton*, *Ferns of North America*, ii., p. 4.

N. (Eunephrodium) sagittæfolium — Eu-neph-ro′-dĭ-um; sag-it-tæ-fol′-ĭ-um (arrow-leaved), *Moore.*

A stove species, of large dimensions, but of little decorative value, native of Java.—*Hooker*, *Species Filicum*, iv., p. 78.

N. (Lastrea) Salvini—Las′-tre-a; Sal-vi′-ni (Salvin's), *Baker.*

This stove species, native of Guatemala, produces spear-shaped fronds 1ft. to 1½ft. long and 3in. to 4in. broad, their stalks being 6in. to 9in. long and provided at the base with a tuft of narrow, brown scales. The spear-shaped leaflets, 1½in. to 2in. long and ¾in. broad, are closely set and cut down to the rachis (stalk of the leafy portion) into overlapping, oblong pinnules (leafits), of a soft yet firm texture, and blunt lobes reaching about half-way down. The sori (spore masses) are disposed at the base of these lobes, often one to each lobe, and covered with a firm, naked involucre.—*Hooker*, *Synopsis Filicum*, p. 274.

N. (Lastrea) sanctum—Las′-tre-a; sanc′-tum (sacred), *Baker.*

A stove species, of particularly small dimensions, native of the West Indies and Guatemala; it is a perfect gem, which, although well adapted for growing in a Fern-case, has a great dislike to being watered overhead. Its habit is very peculiar, as its growth is rosulate—that is to say, its numerous spear-shaped fronds, which seldom exceed 9in. in length and 2in. in breadth,

are arranged in a rosette round the short, upright caudex (stem) from which they are produced; they are borne upon densely-tufted, slender stalks, 2in. to 3in. long. The leaflets are barely 1in. long, bluntish at the point, with the edge more or less deeply cleft; their lobes are sometimes close and narrow-oblong, at other times distinct and spathulate (spoon-shaped). The fronds are of a soft, papery texture and dark shining green colour, and are slightly glandular on their under-side. The small and numerous sori (spore masses) are covered with an involucre of a very fugacious nature.—*Hooker*, *Species Filicum*, iv., p. 252. *Nicholson*, *Dictionary of Gardening*, ii., p. 443.

N. (Lastrea) scabrosum—Las′-tre-a; scab-ro′-sum (rough), *Baker*.

This greenhouse species, which is the *Polypodium nigrocarpum* of Beddome, is a native of the Neilgherries. Its ample fronds, 1½ft. to 2ft. long and 1ft. to 1½ft. broad, are borne on slender stalks 1½ft. to 2ft. long, furnished throughout with small, egg-shaped, straw-coloured scales. The leaflets, 6in. to 9in. long and 3in. to 5in. broad, have the pinnules (leafits) of the lower side largest, with spear-shaped segments cut down nearly to the rachis (stalk of the leafy portion) into toothed, strap-shaped lobes of a soft, papery texture. The small sori (spore masses), disposed usually one at the base of each lobe, are covered with a small, fugacious involucre.—*Hooker*, *Synopsis Filicum*, p. 283. *Beddome*, *Ferns of Southern India*, t. 169.

N. (Eunephrodium) scolopendrioides—Eu-neph-ro′-dĭ-um; scol-op-en′-drĭ-ŏ-i′-des (Scolopendrium-like), *Hooker*.

A stove species, native of the West Indies. It is of little decorative value, with fronds 1ft. long, 1in. to 2in. broad, and of a soft, papery texture. —*Hooker*, *Species Filicum*, iv., p. 65.

N. (Sagenia) semibipinnatum—Sag-e′-nĭ-a; se-mib-ip-in-na′-tum (half-bipinnate), *Baker*.

This stove species, native of Penang and Borneo, produces fronds 1ft. to 1½ft. long and 6in. to 9in. broad, composed of a narrow-oblong, terminal leaflet 6in. to 9in. long, entire, and narrowed towards both ends, and four to six smaller lateral ones on each side. They are of a soft, papery texture,

and their small and scattered sori (spore masses) are confined to the connected veinlets.—*Hooker*, *Species Filicum*, iv., p. 59, t. 231. *Beddome*, *Ferns of British India*, t. 137.

N. (Lastrea) semihastatum — Las′-tre-a ; se-mĭ-has-ta′-tum (half halbert-shaped), *Hooker.*

This stove species, of botanical interest only, is a native of Peru. Its peculiar-shaped little fronds, seldom more than 6in. long, are borne on slender stalks 3in. to 4in. long, of a hairy nature.—*Hooker*, *Species Filicum*, iv., p. 87.

N. (Eunephrodium) serra — Eu-neph-ro′-dĭ-um ; ser′-ra (like a saw), *Desvaux.*

A stove species, of large dimensions (better known perhaps as *Lastrea augescens*), native of Cuba, Venezuela, Mexico, &c. Its fronds, of a particularly slender nature, 2ft. to 3ft. long and 1ft. or more in breadth, are produced from a wide-creeping rhizome (prostrate stem) and borne on firm, glossy stalks 1ft. or more in length ; they are broadly spear-shaped, with spreading leaflets 6in. to 9in. long and seldom ½in. broad, cut down about half-way to the midrib into sickle-shaped, sharp-pointed lobes of a somewhat leathery texture and light or pale green in colour. The sori (spore masses), disposed in rows a little apart from the midrib, are covered with a hairy indusium.—*Hooker*, *Species Filicum*, iv., p. 79. *Lowe*, *Ferns British and Exotic*, vi., t. 10.

N. (Lastrea) setigerum — Las′-tre-a ; se-tig′-er-um (bearing bristles), *Baker.*

This strong-growing, greenhouse species, better known under the name of *N. tenericaule*, has a very wide range of habitat, being found in China, Japan, Northern India, &c., in all of which places it appears to occur in great quantities. Its ample fronds, 1ft. to 3ft. long and borne on sometimes naked, sometimes scaly, stalks 1ft. to 2ft. long, are produced from a creeping rhizome (prostrate stem). The lowest leaflets, which are the largest—often 8in. to 12in. long and 4in. to 6in. broad—are divided again into narrow-spear-shaped pinnules (leafits) cut down to the rachis (stalk of the leafy portion) into close, deeply-cleft lobes ; they are of a soft, papery texture and pale

green in colour. The small and numerous sori (spore masses), often eight to twelve to a lobe, are covered with an involucre of a very fugacious nature.—*Hooker*, *Species Filicum*, iv., p. 142, t. 269.

This species, which is very variable in size and general appearance, sometimes produces fronds more or less crested ; completely crested young plants have even been observed, though never named or described by any authority.

N. (Lastrea) setosum—Las′-tre-a ; se-to′-sum (bristly), *Baker*.

A delicate and distinct, stove species, native of Java, also known as *Aspidium setosum*. Its fronds, 1ft. to 1½ft. long and 6in. to 9in. broad, are borne on tufted stalks 4in. to 6in. long, densely clothed with scales of a light brown colour. The lowest leaflets are the largest, and the pinnules (leafits), usually spear-shaped, are cut down to the midrib into long, narrow segments. The fronds are of a soft, papery texture and naked on both surfaces. The sori (spore masses) are disposed in a line close to the midrib.—*Hooker*, *Synopsis Filicum*, p. 274.

N. (Lastrea) Sieboldii—Las′-tre-a ; Sie-bold′-ĭ-i (Siebold's), *Hooker*.

This greenhouse or even hardy species, native of Japan and China, in the neighbourhood of Hong-Kong, and also known in gardens as *Pycnopteris Sieboldii*, is a thoroughly distinct Fern, possessing very little of the general appearance of a Nephrodium. Its singular fronds, of two different kinds, are produced from a decumbent rhizome (prostrate stem) of a very succulent nature, and covered with large, brown, spear-shaped scales. Barren and fertile fronds alike are simply pinnate (only once divided to the midrib), being composed of an entire or slightly-toothed, broadly spear-shaped terminal leaflet 8in. to 12in. long and 1½in. to 2in. broad, and from two to four similar ones on each side, the lowest shortly stalked. Both kinds of fronds are of a coriaceous (leathery) texture, smooth, and glaucous (bluish). The leaflets of the barren fronds, which are borne on roundish, light green stalks seldom more than 8in. long, are somewhat undulated. In the fertile fronds, which are borne on stalks frequently 1ft. long, they are more contracted and entirely covered with large sori (spore masses), scattered irregularly.—*Hooker*, *Species Filicum*, iv., p. 87 ; *Filices Exoticæ*, t. 31. *Nicholson*, *Dictionary of Gardening*, ii., p. 444. *Lowe*, *Ferns British and Exotic*, vi., tt. 34 and 35.

Though generally considered as an evergreen greenhouse species, *N. Sieboldii* is sufficiently hardy to withstand the severity of the English climate, as it is reported by Lowe to have survived the winter of 1854–55 in the open air, while it also withstood the rigours of the winter of 1889–90 unprotected, in the neighbourhood of London.

N. (Sagenia) Simonsii—Sag-e′-nĭ-a ; Sim-ons′-ĭ-i (Simons'), *Baker.*

A greenhouse species, native of the Eastern Himalayas, with fronds bipinnatifid (twice divided nearly to the midrib), and borne on naked, blackish stalks 1½ft. to 2ft. long ; they are deltoid (in shape of the Greek delta, Δ), 1ft. to 1½ft. each way, of a bright green colour, and smooth on both surfaces. The small sori (spore masses), irregularly disposed between the main ribs, are covered with a minute involucre of a fugacious nature.—*Hooker*, *Synopsis Filicum*, p. 504.

N. (Sagenia) singaporianum—Sag-e′-nĭ-a ; sing-ap-or-ĭ-a′-num (from Singapore), *Baker.*

A stove species, of medium dimensions, native of the Malayan Peninsula and Islands, with fronds 1ft. or more long, 2in. to 4in. broad, produced from a creeping rhizome (prostrate stem), and borne on stalks 6in. to 12in. long. These fronds are of a somewhat papery texture, oblong, entire, pointed at the summit, narrowed rather suddenly, and then decurrent (running down) gradually at the base. The closely-set sori (spore masses) are disposed four to six in a line between the midveins.—*Hooker*, *Species Filicum*, iv., p. 42. *Hooker and Greville*, *Icones Filicum*, t. 26.

N. (Eunephrodium) Skinneri — Eu-neph-ro′-dĭ-um ; Skin′-ner-i (Skinner's), *Hooker.*

This stove species, native of Guatemala and the Andes of Ecuador, is of small dimensions, its sharply-pointed, spear-shaped fronds, borne on slender, tufted stalks 2in. to 3in. long and hairy, being seldom more than 8in. long and 1in. broad. They terminate abruptly below, and have oblong-sickle-shaped, nearly entire lobes reaching half-way down in the centre, and often quite to the midrib at the base, of a soft, papery texture, hairy underneath, and with sori (spore masses) close to the edge.—*Hooker*, *Species Filicum*, iv., p. 64 ; *Second Century of Ferns*, t. 25.

N. (Lastrea) Sloanei—Las′-tre-a ; Sloan′-ĕ-i (Sloane's), *Baker.*

A stove species, much in the way of *N. patens*, but of larger dimensions, of more rigid habit, and with narrower and more sharply-pointed lobes. Its fronds, 3ft. to 4ft. long, are produced from a stout, wide-creeping, scaly rhizome (prostrate stem). It is a native of Mexico and Cuba, and extends southward to Brazil and Peru.—*Hooker*, *Synopsis Filicum*, p. 263.

N. (Eunephrodium) sophoroides—Eu-neph-ro′-dĭ-um ; soph-or-ŏ-i′-des (Sophora-like), *Desvaux.*

This greenhouse species is a native of Japan, Hong-Kong, and Formosa. Its fronds are 1ft. to 2ft. long and 6in. to 9in. broad, and are borne on slender stalks 1ft. or more long and of a downy nature. The spreading leaflets are of a soft, papery texture, 4in. to 6in. long, ½in. to ¾in. broad, and sharp-pointed at their extremity, with the edge cut about one-third of the way down into oblong-triangular lobes. The sori (spore masses) are distant from the midrib.—*Hooker*, *Species Filicum*, iv., p. 68. *Nicholson*, *Dictionary of Gardening*, ii., p. 444.

N. (Lastrea) sparsum—Las′-tre-a ; spar′-sum (scattered), *Don.*

This noble-looking, greenhouse species, also known in gardens under the name of *N. purpurascens*, has a very wide range of habitat, being found from Northern India to North China, in Ceylon, the Malayan Islands, Mauritius, &c. Beddome, in his excellent work on Indian Ferns, states that it is a common plant in most mountainous tracts on the western side of the Madras Presidency. Its broadly spear-shaped fronds, 1ft. to 2ft. long, 8in. to 12in. broad, and borne on glossy stalks 6in. to 12in. long, are produced from a short, upright, stout trunk covered with egg-shaped, pointed, chaffy scales. The lowest leaflets, 4in. to 6in. long and 1½in. to 2in. broad, are the largest. The lowest pinnules (leafits) are sometimes again divided, the others, spear-shaped and unequal-sided, being deeply cleft into oblong, blunt lobes : all are of a papery yet firm texture and of a pale green colour. The abundant sori (spore masses) are usually disposed one to each lobe, and placed near the midrib ; they are covered with a flat, naked involucre about one line broad.—*Hooker*, *Species Filicum*, iv., p. 132, t. 262. *Nicholson*, *Dictionary of Gardening*, ii., p. 444. *Beddome*, *Ferns of Southern India*, t. 103.

N. s. gracile—grac′-il-ĕ (slender), *Moore*.

This is the most distinct, as also the prettiest, known variety of *N.* (*Lastrea*) *sparsum*, five forms of which are described in Hooker and Baker's "Synopsis Filicum," p. 498. The fronds of *N. s. gracile*, lanceolate and bipinnatifid (spear-shaped and twice divided nearly to the midrib), vary from 3in. to 4in. in length; they are borne on short, slender stalks, which, as may be seen from Fig. 138 (reduced from Col. Beddome's "Ferns of British India," by the kind permission of the author), are clothed throughout with conspicuous scales.—*Beddome*, *Ferns of British India*, t. 198.

Fig. 138. Nephrodium sparsum gracile (¼ nat. size).

N. (Lastrea) Spekei—Las′-tre-a; Spe′-kĕ-i (Capt. Speke's), *Baker*.

A stove species, of medium dimensions, native of Johanna Island and Angola. Its fronds, borne on slender stalks 1ft. long, are 1½ft. to 2ft. long and 9in. to 12in. broad; they are furnished with entire leaflets 4in. to 6in. long, 1in. broad, and cut down very nearly to the midrib, and are of a soft, papery texture. The sori (spore masses) are disposed midway between the edge and the midrib.—*Hooker*, *Synopsis Filicum*, p. 263.

N. (Lastrea) spinulosum—Las′-tre-a; spi-nul-o′-sum (somewhat spiny), *Desvaux*.

This hardy species, known under the popular name of "Prickly Shield Fern," has a very wide range of habitat, being found in Arctic Europe and America, southward to Madeira, the Mediterranean, on the Himalayas, and also, though sparingly, in Bourbon Island and Cape Colony. Eaton, in his excellent work on the "Ferns of North America" (vol. ii., p. 166), states that it is usually met with in shady woods, often in springy places, and along shaded rivulets from Newfoundland to Oregon and North-Western America, and extending southward to North Carolina, Tennessee, and Arkansas. In England it has been found in the Isle of Man; near Ingleborough, Pottery

Car, at Doncaster, and at Richmond, in Yorkshire; in Shropshire; in Warwickshire; in Derbyshire; in Norfolk; in Sussex; at Tunbridge, in Kent; in Devonshire, &c. In all these places it grows in marshy spots, moist wooded ground, and wet hedgerows. Its fronds, which are produced from a tufted crown, are borne on slender stalks about 1ft. long and sparingly clothed with somewhat pointed scales; they are 1ft. to 1½ft. long, 6in. to 8in. broad, and oblong-spear-shaped in shape. The lowest leaflets, somewhat triangular, are 3in. to 4in. long and 1½in. to 2in. broad. The broadly spear-shaped pinnules (leafits), about 1in. long and ½in. broad, are cut down to the rachis (stalk) below into oblong lobes, copiously furnished with sharp-pointed teeth. The fronds are of a soft, papery texture and of a pale green colour. The sori (spore masses) are covered with a persistent involucre.—*Hooker*, *British Ferns*, t. 20. *Nicholson*, *Dictionary of Gardening*, ii., p. 444. *Eaton*, *Ferns of North America*, ii., t. 68.

This fine, erect-growing species is well adapted for the moist parts of the Fernery, or the shady parts of the shrubbery, where, through its bold, free habit, it is rendered very distinct and decorative. The plant will bear a moderate degree of exposure, though it prefers shade; but, whichever situation it may occupy, a good supply of water at its roots is necessary all the year round.

N. spinulosum has produced a few varieties, among which the following are the most distinct:

N. s. Boottii—Boot′-tĭ-i (Boott's), *Gray*.

This variety, which, in Eaton's work on "Ferns of North America," is illustrated and described as a distinct species, though it is said to occur in England, in Continental Europe, and in Siberia, is much commoner in North America, where it is said to grow naturally in wet places in woods, often in alder thickets near streamlets or ponds. Its was, according to Eaton, first discovered near Lowell, Massachusetts, by W. Boott as far back as 1843, and has since been found by several collectors near Fresh Pond, Cambridge, in Middlesex County; near Amherst and near Pelham, in the same State; also in Connecticut, Southern New York, and Delaware. So far as the structure of its rootstock and its mode of growth are concerned, there is nothing to distinguish this Fern from *N. cristatum* or from *N. spinulosum*. Its fronds,

of a deep green colour and moderately firm texture, smooth above, and slightly scaly beneath, are disposed in a circle or crown, and stand fully 3ft. high, including stalks, in the largest plants; the stalks, when young, are chaffy with egg-shaped, rusty-coloured, shining scales, most of which drop off as the season advances. The spear-shaped leaflets are distant, and their lowest pinnules (leafits), about ½in. long and ¼in. broad, are cut from one-third to half the way down to the rachis (stalk) below.—*Eaton*, *Ferns of North America*, ii., t. 69.

N. s. crispum—cris′-pum (curled), *Moore.*

A variety of normal size, but of very rigid habit, with the margins of the lobes closely rolled back and partially hiding the sori (spore masses), which are very large and very dark in colour. This plant, which is described by Dr. Deakin in his "Florigraphia Britannica," was originally found near Sheffield.—*Lowe*, *Ferns British and Exotic*, i., p. 328.

N. s. intermedium—in-ter-med′-ĭ-um (intermediate), *Muhlenberg.*

This variety, which, according to Eaton, is the common form of the species in the North United States, seems to be exclusively North American. It has nearly the same range as the species, but extends to Tennessee and probably to Arkansas; it is not reported from Newfoundland. It has dark green fronds a little broader in outline than those of the type, not unfrequently 22in. long and 9in. broad. The leaflets are more spreading than in the type; the lowest ones are sometimes nearly 3in. distant from the next, and the first or basal pinnule (leafit) is generally a little shorter than the second one, as specially noticed by Milde. The indusium which covers the sori (spore masses) is sprinkled on the surface and at the margin with stalked and stalkless glands. The fronds are generally of larger dimensions and more finely cut than in our typical plant.—*Hooker*, *Synopsis Filicum*, p. 277. *Eaton*, *Ferns of North America*, ii., p. 164.

N. s. tripinnatum—trip-in-na′-tum (three times pinnate), *Moore.*

A very handsome Fern, with narrow, upright fronds of a somewhat stiff habit. The leaflets of the fronds are short; their pinnules (leafits) are small, the anterior and posterior ones being unequal in size; these pinnules

are distinctly divided into segments, which are oblong, blunt-toothed, and sometimes twice toothed.—*Lowe*, *Our Native Ferns*, i., p. 329.

N. (Lastrea) Sprengelii—Las′-tre-a ; Spreng-el′-ĭ-i (Sprengel's), *Hooker*.

A stove species, of large dimensions but of little decorative value, native of the West Indies and Guatemala.—*Hooker*, *Species Filicum*, iv., p. 94.

N. (Lastrea) Sprucei—Las′-tre-a ; Spru′-cĕ-i (Spruce's), *Baker*.

This stove species, native of the Andes of Ecuador, has fronds 2ft. to 3ft. long and 8in. to 12in. broad, with leaflets 4in. to 6in. long, 1in. broad, of a soft, papery texture, and cut down nearly to the rachis (stalk) into spreading lobes with a considerable space between them. The sori (spore masses), placed nearer the midrib than the edge, are covered with a large, distinct involucre. —*Hooker*, *Synopsis Filicum*, p. 269.

N. (Lastrea) Standishii—Las′-tre-a ; Stand-ish′-ĭ-i (Standish's).

This is the popular or commercial name, for which we can find no authority, for a very useful and highly decorative Fern, the proper or botanical name of which is *Aspidium laserpitiifolium*.

N. (Eunephrodium) subcuneatum—Eu-neph-ro′-dĭ-um ; sub-cun-ĕ-a′-tum (nearly wedge-shaped), *Baker*.

A stove species, of small dimensions, native of Cayenne, producing from a short-creeping rhizome (prostrate stem) its broadly-spear-shaped fronds, of a dull green colour on both surfaces. The small sori (spore masses) are covered with a smooth, fugacious involucre.—*Hooker*, *Synopsis Filicum*, p. 503.

N. (Lastrea) subquinquefidum — Las′-tre-a ; sub-quin-quef′-id-um (somewhat five-cleft), *Hooker*.

This very pretty, stove species, which is also known in gardens under the various names of *N. funestum*, *N. pilosissimum*, and *N. Vogelli*, has a very wide range of habitat, being found from the West Indies to Brazil, in the Island of Nissobe, in Angola, on the Guinea Coast, and in Senegambia. It is of medium dimensions only, for its fronds, which are borne on brownish, firm stalks 1ft. or more long and naked or hairy upwards, are 6in. to 18in.

each way. The lower leaflets are much the largest, and the pinnules (leafits) on the lower side are much larger than the others, which are 1in. to 3in. long and about 1in. broad, often cut down to the rachis (stalk of the leafy portion) below into broad, oblong lobes of a soft, papery texture and dark green colour. The sori (spore masses) are disposed along the midvein.—*Hooker*, *Species Filicum*, iv., p. 129, t. 259. *Nicholson*, *Dictionary of Gardening*, ii., p. 444.

N. (Sagenia) subtriphyllum—Sag-e′-nĭ-a ; sub-triph-yl′-lum (somewhat three-leaved), *Baker*.

A stove species, of medium dimensions, native of Polynesia, China, Malaya, Ceylon, and the Mascarene Islands. Its fronds, produced from a creeping

Fig. 139. Frond of Nephrodium subtriphyllum
(¼ nat. size).

rhizome (prostrate stem) and borne on brownish stalks 1ft. or more in length, are 1ft. to 1½ft. long, 8in. to 12in. broad, and sub-deltoid (nearly in shape of the Greek delta, Δ) ; they are composed of a large, deeply-cleft terminal leaflet, with spear-shaped lobes, and one or two leaflets on each side. These leaflets are usually distant, auricled at the base, and spear-shaped at the point, and are of a soft, papery texture. The rather large but scattered sori (spore masses) are confined to the connected veinlets. Fig. 139 is reduced from Col. Beddome's "Ferns of Southern India," by the kind permission of the author.—*Hooker*, *Species Filicum*, iv., p. 52. *Beddome*, *Ferns of Southern India*, t. 242.

N. (Lastrea) tenericaule — Las′-tre-a ; ten-er-ic-au′-lĕ (tender-stalked). Synonymous with *N. setigerum.*

N. (Lastrea) tenuifolium—Las′-tre-a ; ten-˘-if-ol′-ĭ-um (slender-leaved), *Hooker.*

A stove species, of medium dimensions and of little decorative value. It is a native of the Fiji Islands.—*Hooker, Species Filicum*, iv., p. 144.

N. terminans—ter′-min-ans (terminating). A synonym of *N. pteroides.*

N. (Lastrea) Thelypteris — Las′-tre-a ; The-lyp′-ter-is (Thelypteris), *Desvaux.*

This perfectly hardy species, popularly known in England as the "Female Buckler Fern," or the "Marsh Shield Fern," is of a thoroughly cosmopolitan character, as it is found in quantities in both hemispheres. In Europe it extends from Norway to Spain ; in Cashmere it occurs at elevations varying between 5000ft. and 6000ft., while it is stated by Beddome (who, in "Ferns of British India," describes it under the name of *Lastrea Fairbankii*) to be found in swamps on the Pulney Mountains at an altitude of 4000ft. It is also a native of Cape Colony, Angola, Natal, New Zealand, Bermuda, Japan, &c. It is quoted by Eaton as a very common Fern in marshes and wet places, but sometimes also in dry ground from Lake Winnipeg, British America, and North Brunswick to Louisiana and Florida. This Fern was first noticed as an English plant by Ray, who, in his "Synopsis Methodica Stirpium Britannicarum," mentions it as the *Filix minor palustris repens* ("Creeping Water Fern, or lesser Marsh Fern"). *N. Thelypteris* is a most interesting Fern on account of its being found in various parts of the United Kingdom, generally in boggy meadows and marshes, especially where the soil is gravelly. It is commoner in Scotland than in England or Ireland. In the latter country it is limited to the marshes of Glencree, in Wicklow, and the neighbourhood of Neveruss, Killarney. In England it is found on Learmouth Bogs, in Northumberland ; near Settle, in Yorkshire ; at Allesley, in Warwickshire ; on Knutsford Moor and New Church Bog, near Over, in Cheshire ; and on Oxton Bogs, in Nottinghamshire. It is also stated to have existed formerly in Windsor Park and Sunninghill Wells, in Berkshire ; in the valley below Cæsar's Camp, on Wimbledon Common ; in a bog on

Pteris cretica Ouvrardi

(much reduced)

Waterdown Forest, near Tunbridge Wells, and in various other places where it is now extinct. It is found in Wales, in a moist dell at the foot of Snowdon, near Llanberis, and near Beaumaris, in Anglesey.

The fronds of *N. Thelypteris*, which rise from a very slender, wide-creeping rootstock or rhizome, nearly black and almost devoid of chaffy scales, keeping just beneath the surface of the ground, are borne on round, naked stalks about 1ft. long, of a slender nature, and scattered at long intervals along the rootstock. They are 1ft. to 2ft. long, 4in. to 6in. broad, and furnished with spreading leaflets 2in. to 3in. long and ½in. broad, cut down very nearly to the midrib into spreading, narrow-oblong lobes, which are broader in the barren than in the fertile fronds. The lower two or three pairs of lobes are usually a little shorter than those above them, and fronds are occasionally found in which they are conspicuously reduced. Although the surface of the fronds appears smooth, careful examination reveals a slight pubescence along the midrib and veins, especially on the under-surface; they are of a very thin, papery texture and of a delightful green colour. The sori (spore masses) are distinctly disposed in rows near the recurved edge.—*Hooker, Species Filicum*, iv., p. 88; *British Ferns*, t. 13. *Nicholson, Dictionary of Gardening*, ii., p. 444. *Eaton, Ferns of North America*, i., t. 30. *Beddome, Ferns of British India*, t. 254. *Correvon, Les Fougères rustiques*, p. 132.

This interesting Fern would flourish luxuriantly in the company of Osmundas, in a low, boggy situation, a constantly damp soil, of a peaty or open nature, being indispensable to its welfare.

N. (Lastrea) Thwaitesii—Las′-tre-a; Thwaites′-ĭ-i (Thwaites'), *Baker.*

A stove species, native of Ceylon, greatly resembling *N. deparioides* in general outline, but differing from that species through its small spore masses being quite marginal instead of terminal in the teeth of the lobes of its fronds. —*Hooker, Synopsis Filicum*, p. 277. *Beddome, Ferns of Southern India*, t. 247.

N. (Lastrea) tomentosum—Las′-tre-a; to-men-to′-sum (downy), *Desvaux.*

This stove species, of medium dimensions, is of little decorative value. It is a native of Mauritius, Bourbon, and Tristan d'Acunha.—*Hooker, Species Filicum*, iv., p. 95.

N. (Eunephrodium) truncatum — Eu-neph-ro′-dĭ-um ; trun-ca′-tum (truncate, maimed), *Presl.*

This very fine but very rare, greenhouse species, also known as *N. abruptum*, *N. eusorum*, and *N. Hudsonianum*, is a native of North India, Malacca, Australia, and Polynesia. It is a plant of large dimensions, its fronds, which are 2ft. to 4ft. long and 1ft. to 1½ft. broad, being borne on tufted, stout, upright stalks 2ft. long, greyish in colour, and of a slightly hairy nature. The leaflets, 6in. to 9in. long and 1in. broad, are

Fig. 140. Frond of Nephrodium undulatum
(⅓ nat. size)

cut down one-third or more of the distance to the midrib into blunt, spreading, oblong lobes, of a soft, papery texture. The sori (spore masses) are disposed one on each veinlet, close to the main vein.—*Hooker*, *Species Filicum*, iv., p. 77, t. 241B. *Nicholson*, *Dictionary of Gardening*, ii., p. 444. *Beddome*, *Ferns of British India*, t. 130.

N. (Lastrea) undulatum—Las′-tre-a ; un-dul-a′-tum (wavy), *Baker.*

This is a very distinct and elegant, stove species, native of Ceylon, and, according to Beddome, found at Wattekelle, Kallibokka, at an elevation of

5000ft. In general appearance it somewhat resembles the better-known, peculiar-looking Fern, *Adiantum Féei*, as its fronds possess the same zigzag outline, produced by the flexuose habit of their rachis (stalk of the leafy portion). These fronds are 1ft. or more long, 6in. to 8in. broad, broadly egg-shaped, and borne on tufted stalks 6in. to 12in. long, scaly towards the base, but glossy upwards. The main rachis, which is very distinctly zigzag, is furnished with pinnæ deflexed (leaflets thrown back) and then curved upwards and overlapping (Fig. 140); the lowest pair, usually the largest, are 4in. to 6in. long, 2in. to 3in. broad, and divided into nearly triangular pinnules (leafits), these being again cut into broadly egg-shaped segments, on which the somewhat large sori (spore masses) are disposed near the midrib. The whole plant, besides being curious, is also rendered very attractive by the pale green colour of its fronds, which are naked on both sides.—*Hooker*, *Synopsis Filicum*, p. 276. *Beddome*, *Ferns of Southern India*, t. 271.

N. (Eunephrodium) unitum—Eu-neph-ro′-dĭ-um ; u-ni′-tum (joined), *R. Brown.*

This fine, stove species, of medium dimensions, has a very wide range of habitat, extending from Florida and the West Indies to Brazil and Peru, and embracing Polynesia, Australia, New Zealand, Natal, Cape Colony, Algiers, &c. Its fronds, borne on brownish, naked stalks 1ft. to 1½ft. long, are 2ft. or more in length, 6in. to 8in. broad, and furnished with leaflets 4in. to 5in. long and ½in. broad, their edge being cut from one-third to half the way down into spreading, triangular, sharp-pointed lobes, of a leathery texture. The sori (spore masses) are situated at the extremities of the veinlets, principally in the lobes.—*Hooker*, *Species Filicum*, iv., p. 79. *Nicholson*, *Dictionary of Gardening*, ii., p. 444.

N. u. glabrum—glab′-rum (smooth), *Mettenius.*

This variety, which in North America is known under the popular name of "Rounded Shield Fern," is stated by Eaton to grow in the swamps and bogs of Southern California. According to the same authority, it is also widely distributed through the West Indies, Guiana, Brazil, West Africa, Mauritius, Java, Ceylon, Sumatra, Borneo, &c. It is said to differ from the species principally in the nature of its fronds, which are sometimes perfectly

smooth; but frequently a few little scales and a very scanty and minute pubescence (down) may be detected along the midribs and veins, especially along the margin of the lobes. Eaton adds (p. 76) that, although known since the beginning of the present century, this Fern was first discovered within the limits of North America in 1873 by Mr. C. E. Faxon, who collected it near Enterprise, Florida.—*Eaton*, *Ferns of North America*, i., t. 13.

N. (Lastrea) varium—Las′-tre-a; var′-ĭ-um (variable).

The Fern cultivated under this name in gardens is the *Aspidium varium* of Swartz. It is closely related to *N. erythrosorum*, its foliage being of the same leathery and fog-resisting nature.

N. (Eunephrodium) venulosum—Eu-neph-ro′-dĭ-um; ve-nul-o′-sum (small-veined), *Hooker*.

A greenhouse species, of large dimensions, native of Fernando Po. Its fronds, rising from a creeping rhizome (prostrate stem), are 4ft. long and 1ft. to 1½ft. broad, and are borne on sharply-angled, greenish, naked stalks 1½ft. long; they are furnished with numerous leaflets, the lowest of which are short and very distant. The largest leaflets, 8in. to 9in. long and 1in. broad, are cut down half-way to the midrib into slightly-toothed, oblong lobes of a somewhat leathery texture, bright green in colour, and naked on both surfaces. The sori (spore masses) are disposed on each vein about half-way to the edge.—*Hooker*, *Species Filicum*, iv., p. 71. *Nicholson*, *Dictionary of Gardening*, ii., p. 444.

N. (Eunephrodium) venustum—Eu-neph-ro′-dĭ-um; ven-us′-tum (charming), *J. Smith*.

This is a very handsome, stove species, of medium dimensions, native of Jamaica. Its fronds, borne on tufted, greyish, glossy stalks 1ft. or more in length, are 2ft. or more in length and 1ft. in breadth, and are furnished with numerous spreading leaflets, 6in. long and 1in. broad, cut into blunt, oblong lobes reaching half-way down to the rachis (stalk), and of a soft, papery texture. The sori (spore masses) are disposed principally in the lobes close to the edge.—*Hooker*, *Species Filicum*, iv., p. 71. *Nicholson*, *Dictionary of Gardening*, ii., p. 444.

N. (Lastrea) vestitum—Las′-tre-a ; ves-ti′-tum (clothed), *Baker.*

This stove species, also known in gardens as *N. Raddianum*, is a native of Brazil. It has a very striking appearance, produced by the long, woolly, cinnamon-coloured scales which densely cover its stalks on their entire length. These stalks are 6in. to 12in. long and bear very decorative fronds 1ft. to 2ft. long and 6in. to 10in. broad. The leaflets, 3in. to 5in. long and about 1in. broad, are cut down to a narrowly-winged midrib into blunt, sickle-shaped lobes of a soft, papery texture and bright green colour. The sori (spore masses) are situated close to the midrib.—*Hooker*, *Species Filicum*, iv., p. 98, t. 245. *Nicholson*, *Dictionary of Gardening*, ii., p. 444.

N. (Lastrea) villosum—Las′-tre-a ; vil-lo′-sum (hairy), *Presl.*

This evergreen, stove species, which is said sometimes to attain a height of 18ft., is a noble species when well grown. It is a native of the West Indies, Jamaica, and the Caribbean Islands, and, according to Lowe, was introduced into the Royal Gardens, Kew, in 1844, by Mr. N. Wilson. Its gigantic fronds are borne on stout stalks 2ft. to 3ft. long, usually hairy, and clothed with spreading scales ; they are produced from an arborescent trunk, and their stalks and rachises (stalks of the leafy portion) are completely covered with narrow, fringed scales. The leaflets, often 2ft. long and 1ft. broad, are divided into spear-shaped pinnules (leafits) cut down to the rachis into close, oblong, deeply-cleft segments of a soft, papery texture and pale green colour. The abundant sori (spore masses), disposed half-way between the midvein and the edge, are covered with a flat involucre, which is as often suppressed as developed.—*Hooker*, *Species Filicum*, iv., p. 134, t. 264. *Nicholson*, *Dictionary of Gardening*, ii., p. 444. *Lowe*, *Ferns British and Exotic*, vi., t. 37.

N. (Lastrea) viscosum—Las′-tre-a ; vis-co′-sum (slimy), *Baker.*

A stove species, of small dimensions and little decorative value, native of Malacca, the Philippine Islands, and Borneo.—*Hooker*, *Synopsis Filicum*, p. 264.

N. (Lastrea) Vogelli—Las′-tre-a ; Vo-gel′-li (Vogel's). A synonym of *N. subquinquefidum.*

N. (Lastrea) Walkeræ—Las′-tre-a ; Walk′-er-æ (Mrs. Walker's), *Baker.*

A very handsome, stove species, native of Ceylon, producing an abundance of ample, leathery, oblong-spear-shaped fronds of a somewhat rigid habit, often measuring 3ft. in length by 1ft. in breadth. These fronds, which are simply pinnate (only once divided to the midrib), are borne on stout stalks 1ft. to 1½ft. long, clothed throughout with narrow, pale brown, glossy scales. This species is, however, very variable, as sometimes plants of it are found with deeply-cleft leaflets, which organs are often furnished with a large auricle (ear) at the superior base. The whole plant is more or less densely clothed with bristly scales, which produce a very striking and pleasing appearance.—*Hooker*, *Synopsis Filicum*, p. 493. *Beddome*, *Ferns of British India*, t. 334.

N. (Lastrea) Wardii—Las′-tre-a ; Ward′-ĭ-i (Ward's), *Baker.*

A stove species, of medium dimensions, native of the Seychelles. Its fronds are deltoid (in shape of the Greek delta, Δ), 2ft. long, and very finely divided, being four or five times pinnatifid (divided half-way to the midrib). The numerous leaflets are distinctly stalked, as are also their pinnules (leafits), while the final lobes are oblong in shape, closely set, of a fragile texture, smooth, and bright green on both surfaces. The large sori (spore masses), disposed along the midveins, are covered with a smooth, persistent involucre.—*Hooker*, *Synopsis Filicum*, p. 500.

N. (Eunephrodium) Wrightii — Eu-neph-ro′-dĭ-um ; Wright′-ĭ-i (Wright's), *Hooker.*

This pretty, stove species, native of Cuba, produces from a creeping rhizome (prostrate stem) oblong-spear-shaped fronds 6in. to 9in. long and 1½in. broad, borne on upright, firm stalks 4in. to 6in. long and of a greyish colour ; they are cut down nearly to the midrib above, and quite below, into close, oblong, entire or auricled (eared), spreading lobes of a leathery texture and slightly hairy underneath. The sori (spore masses) are disposed close to the margin of the lobes.—*Hooker*, *Species Filicum*, iv., p. 64, t. 239.

CHAPTER XLIII.

NEPHROLEPIS, *Schott.*

(Neph-rol′-ep-is.)

Ladder Ferns.

IN Hooker and Baker's "Synopsis Filicum" *Nephrolepis* forms Genus 45, immediately following *Nephrodium*. Its name is derived from *nephros*, a kidney, and *lepis*, a scale, in reference to the coverings of the sori (spore masses), which are round, arising from the upper branch of a vein, generally near the edge. All the known species, and with very few exceptions their varieties, have their fronds simply pinnate (only once divided to the midrib). These leaflets, instead of being fastened to the rachis (midrib of the leafy portion), are articulated at the base, often very deciduous in the dried plants, and show white dots of a chalky nature on their upper surface. As regards its geographical distribution, this genus, which comprises little more than a dozen species, belts the world in the Tropics, passing a little beyond them both north and south. It has no British representative.

From Eaton's excellent work, "Ferns of North America" (vol. ii., p. 130), we extract the following most valuable information: "The genus *Nephrolepis* was proposed in 1834, by H. W. Schott, for those species of *Nephrodium* or *Aspidium* which had a reniform indusium (kidney-shaped covering of the spore masses) obliquely affixed by its emarginate (notched) base to the side of the enlarged tip of the fertile vein. He gives excellent analytical drawings of *N. exaltata*, and mentions *N. pectinata*, *biserrata*, &c., as also examples of his genus. In the 'Tentamen Pteridographiæ' of Presl, two years later, the genus

is admitted, and over a score of species are referred to it. A new distinctive character is also indicated: 'Pinnæ (leaflets) truly articulated to the rachis, and easily separated from it.' Fée divided the species into two genera, *Nephrolepis* and *Lepidocaulon*, assigning to the former the species with a broadly reniform indusium somewhat laterally attached to the receptacle, and to the latter those with a round, reniform indusium, affixed by the centre; but since specimens are very common in which both forms of indusium occur on the same pinna, it is clearly impossible to make the special form of indusium a generic character. A peculiarity in the genus, which escaped the observation of many of the earlier pteridologists, is the indefinite growth of the fronds. According to the observations of Mettenius, there is no necessary limit to the apical development of the fronds in mature plants. What he has to say on the subject is found in his 'Filices Horti Botanici Lipsiensis,' published at Leipzig in 1856, where (at p. 99) he expresses himself as follows:

"'The rhizome (prostrate stem) of all the cultivated species is raised erect from the soil, without reaching any great height, and is covered with the gradually-decaying leaf-stalks. In all the cultivated species, just below the points where the fronds are inserted on the rhizome, there originate filiform (thread-like) runners, which either produce buds somewhere on their course above ground, or develop tubers at the end which enters the soil, and thus contribute to the multiplication of the plant. The fronds are characterised by the perennial, indefinite growth of the rachis or leaf-stalk, and the consequent unlimited periodical production of pinnæ at the uninjured circinate (crozier-like) apex, long after the older pinnæ have fruited or fallen off. Only in the earliest fronds of plants grown from spores (and also in *N. platyotis* [*N. acuta*] and *N. davallioides*, after the formation of the fertile pinnæ) does the development of the frond terminate with a gradual diminution of the size of the pinnæ, whilst the highest rudimentary side pinna blends with the proper terminal segment. In *N. exaltata* the oldest fronds continue to develop at the apex, and the growth of the frond is limited only by some injury happening to the apex. The limit of the yearly increase of the frond is always indicated by the smaller size of the segments.'"

Hooker includes *Nephrolepis* in the tribe *Asfidieæ*, while Mettenius places it in *Davallieæ*, and Fée locates part of it in each of these Tribes, though the character of the indusium, when fully developed, is unmistakably Aspidioid.

Culture.

Although not a large genus, yet *Nephrolepis* contains some of the most valuable Ferns adapted for planting on rockwork, a position in which they soon form ornamental masses of a striking and attractive character. All Nephrolepises are most tenacious of life, and when it so happens that, through want of moisture at the roots, their leaflets drop off, the plants soon recover; for, after a few weeks of attentive nursing, another crop of fresh foliage usually takes the place of the fronds previously destroyed. The fronds, which in some kinds attain 4ft. in length, are in most, if not in all, cases produced from crowns disposed at various intervals on long, thin, rapid-growing rhizomes (prostrate stems) of a wiry nature. This is a feature peculiar to the plants contained in this genus, and by which means most of them are rapidly increased, especially the reputed barren forms, such as *N. Duffi*, *N. rufescens tripinnatifida*, and the fertile but very variable *N. davallioides furcans*, which, when propagated from spores, produces plants showing their crested character in a more or less marked degree. Where it is desired that these should be increased, they should be planted in a shallow bed of coarsely-broken peat, chopped sphagnum, and silver sand, in about equal parts: in this the rhizomes can freely run and produce young plants, which may be safely severed from the parent when they have developed three or four fronds. Besides the usual rhizomes already alluded to, a few species, such as *N. Bausei*, *N. cordifolia* (*tuberosa*), *N. philippinensis*, *N. pluma*, and *N. undulata*, are also provided at the roots with small tubers of a succulent nature, which likewise produce young plants in a remarkably short time. In this latter section *N. Bausei*, *N. pluma*, and *N. undulata* are entirely deciduous, and, from want of knowledge respecting their habit, have often been lost during their resting season, when some growers keep them so dry that, long before the time comes when they should start into growth again, the tubers have ceased to live. The soil which contains them must, all through the winter, be kept in a moderately moist condition, so as to prevent them from shrivelling up: this is an essential point as regards securing a healthy, strong spring growth.

All the species of *Nephrolepis* are particularly well adapted for basket culture, being naturally of an elegant drooping character; they have also a curious propensity for taking possession of the outer surface of the baskets

and growing all round them, thus making perfect balls of gracefully pendulous foliage, which, provided the plants are well supplied with water at the roots all the year round, remain a long time in perfect condition. On account of the jointed nature of their leaflets, the fronds are of little use in a cut state, as they only last good for a comparatively short time. The plants are specially useful for covering walls and pillars, as they require but very little soil and can almost be kept thriving on moisture alone. Many of them may be propagated from spores, which germinate freely and make young plants in a short time.

Principal Species and Varieties.

N. acuta—ac-u′-ta (acute, sharp), *Presl.*

This very handsome, strong-growing, stove species, also known in gardens under the names *N. biserrata*, *N. ensifolia*, *N. platyotis*, *N. punctulata*, *N. splendens*, &c., is often mistaken for *N. exaltata*, which it only resembles as far as size and general aspect are concerned. Its geographical distribution is very wide, for it is found in Cuba, Guatemala, Peru, and Brazil; also in Polynesia, Hong-Kong, Loo-Choo, and Queensland, as well as in the Mascarene Islands, Zambesi Land, Natal, and Angola, and on the Guinea Coast. The habit of its massive fronds, 2ft. to 4ft. long and 8in. to 12in. broad, which are borne on tufted stalks 4in. to 8in. long, of a naked or slightly scaly nature, is arching rather than pendulous. The leaflets, of a somewhat leathery texture, 4in. to 6in. long and ½in. to 1in. broad, are acute, the edge being entire or slightly notched, the upper side eared, and the lower side rounded at the base. The sori (spore masses) are disposed near the margin, and covered with a nearly round involucre affixed by its centre.—*Hooker*, *Species Filicum*, iv., p. 153. *Nicholson*, *Dictionary of Gardening*, ii., p. 444. *Lowe*, *Ferns British and Exotic*, vii., t. 22. *Beddome*, *Ferns of Southern India*, t. 94.

N. Bausei—Baus′-ĕ-i (Bause's), *Moore.*

This garden-raised plant is one of the most distinct of the whole genus. Its numerous, somewhat erect fronds, more than 1ft. long, leafy from the base (Fig. 141), and of a soft, bright green colour, have a peculiarly graceful appearance produced by the feathery nature of their leaflets, which, instead of

being entire, as is the case with others of the same genus, are pinnatifid (divided nearly to the midrib). This and the dense dwarf habit of the plant render it very striking. It originated among some seedlings of *N. pluma*, and, like that species, thrives equally well in a stove or in an intermediate house, and is entirely deciduous. This plant reproduces itself true from spores, which germinate freely.—*Nicholson, Dictionary of Gardening*, iv., p. 573.

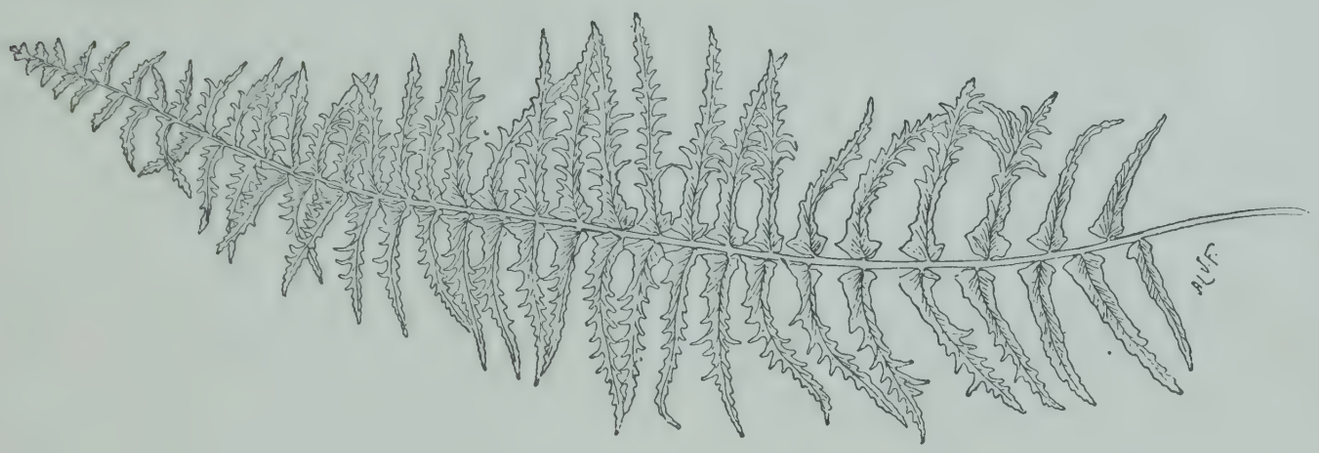


Fig. 141. Frond of Nephrolepis Bausei
(⅛ nat. size).

N. biserrata—bis-er-ra′-ta (twice serrated). Synonymous with *N. acuta.*

N. cordata compacta—cor-da′-ta com-pac′-ta (heart-shaped and dense). A variety of *N. cordifolia.*

N. cordifolia—cor-dif-ol′-ĭ-a (having heart-shaped leaves), *Presl.*

This is perhaps the most useful of all the known species from a decorative point of view; it thrives well under cool treatment. It is more extensively known in gardens under the name of *N. tuberosa*, and sometimes is also met with under those of *N. imbricata* and *N. obtusifolia.* Its range of habitat extends from Cuba and Mexico to Brazil and Peru, and from Japan and India southward to Australia and New Zealand; it is also found in the Mascarene Islands and Zambesi Land, and on the Guinea Coast. Beddome, in his excellent work on "Ferns of Southern India," states that it is common in the sub-alpine jungles of the western side of the Madras Presidency. It is of intermediate size and somewhat erect in habit. The fronds, borne on tufted, wiry stalks slightly scaly at the base, are 1ft. to 2ft. long and seldom more than 2in. broad.

The numerous leaflets, about 1in. long and $\frac{1}{3}$in. broad, are very closely set, sometimes overlapping; their base is rounded or heart-shaped on the lower side and distinctly eared on the upper side; they are usually blunt, have their edge entire or slightly notched, and are of a rich dark green colour. The sori (spore masses), disposed in a row about half-way between the midrib and the edge, are covered with a firm, distinctly kidney-shaped involucre, oblique or opening towards the outer edge. Fig. 142 is reduced from Col. Beddome's "Ferns of Southern India," by the kind permission of the author.—*Hooker*, *Species Filicum*, iv., p. 151. *Nicholson*, *Dictionary of Gardening*, ii., p. 445. *Beddome*, *Ferns of Southern India*, t. 92. *Lowe*, *Ferns British and Exotic*, vii., t. 25.

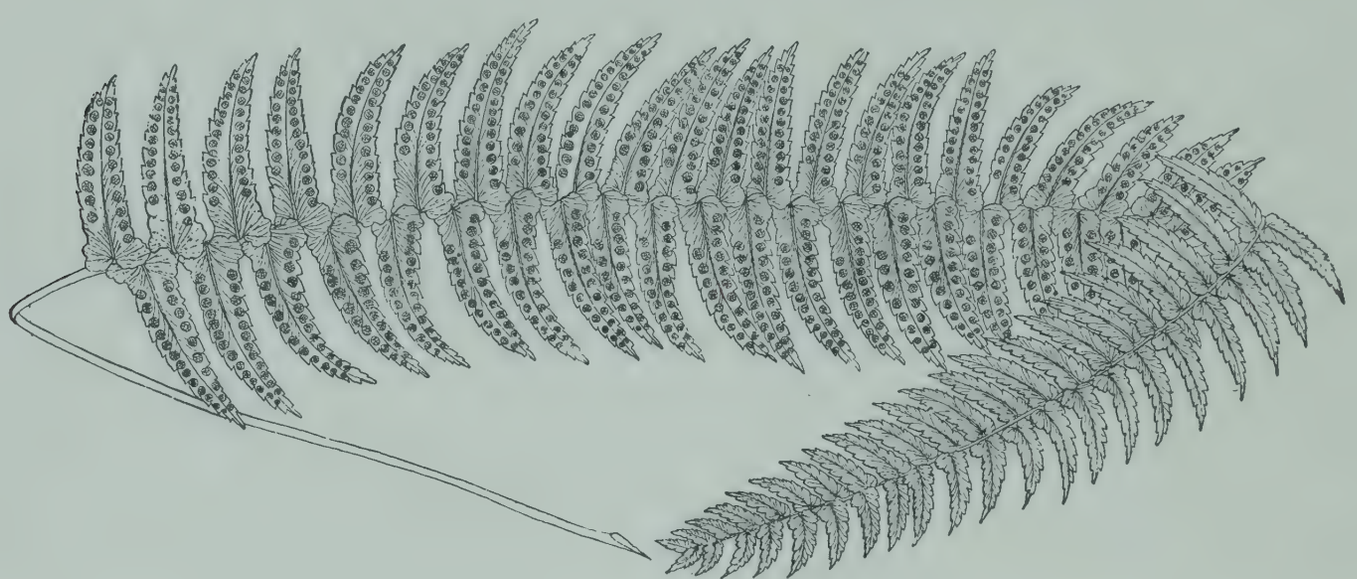


Fig. 142. Frond of Nephrolepis cordifolia
($\frac{1}{2}$ nat. size).

N. c. compacta—com-pac′-ta (compact).

Under the name of *N. cordata compacta*, for which we can find no authority, there has recently been distributed a most elegant form of the above species. Its arching fronds spread in all directions from a common centre; they are from 1$\frac{1}{2}$ft. to 2ft. long, and are furnished with leaflets from the base. The leaflets are closely disposed along the rachis (stalk of the leafy portion), and are oblong in form, leathery in texture, seldom more than 1in. long, elegantly toothed, and of a deep glossy green colour, with a darker mid-nerve. This variety thrives equally well in the intermediate house or in the stove, and reproduces itself freely from spores.

N. c. pectinata—pec-tin-a′-ta (comb-like), *Schott.*

This handsome Fern, usually acknowledged as a species, but which by the authors of "Synopsis Filicum" is regarded as only a variety of *N. cordifolia*, is a native of Tropical America, and is undoubtedly one of the gems of the genus. Its close, compact, yet graceful habit, coupled with the greyish colour of its comparatively short and slender fronds, borne on perfectly naked stalks, make it quite unique. Either grown in a pot or in a basket of small dimensions, or planted in a perpendicular wall, it is most useful. Contrary to most other kinds, it produces fine bushy plants in small pots suitable for table-decoration, and it is not uncommon to find in a 10in. basket as many as 150 gracefully-pendulous, slender fronds seldom exceeding 1½ft. in length. The leaflets, which are oblong in shape and toothed at the edges, are closely set together, and, being distinctly auricled (eared) at the base, form an uninterrupted line all along the midrib. The plant does not produce any tubers, but it is one of the kinds most readily propagated from spores. Although introduced into the Royal Gardens, Kew, as late as 1841, we have it on the authority of Lowe that it was known in some of the English gardens as far back as 1820.—*Hooker*, *Synopsis Filicum*, p. 301. *Nicholson*, *Dictionary of Gardening*, ii., p. 445. *Lowe*, *Ferns British and Exotic*, vii., t. 18.

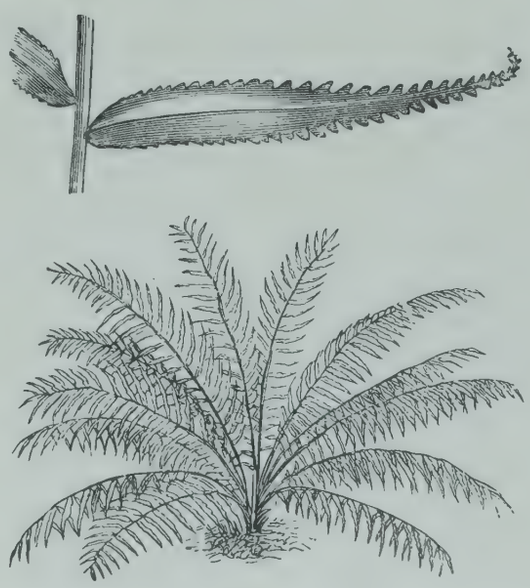


Fig. 143. Nephrolepis davallioides, showing Habit and Barren Leaflet.

(Habit, much reduced; Portion of Frond, ⅓ nat. size).

N. davallioides — dav-al-lĭ-ŏ-i′-dēs (Davallia-like), *Kunze.*

This magnificent, stove species, of large dimensions, is a native of the Malayan Archipelago, the East Indies, and Java. Its vigorous constitution and the graceful habit of its arching fronds (Fig. 143), 2ft. to 3ft. long, 1ft. broad, and borne on stalks 1ft. or more long, make it a plant of no ordinary merit. These fronds are symmetrically disposed in a fibrous crown, which sends forth on all sides stolons of a wiry nature and of great length; these delight in creeping on the surface of the ground or in some very loose

material, such as partly-decayed moss, sending up here and there tufts of new fronds. The stalks on which the fronds are borne are stout, round, channelled in front, and scaly at the base only. The leaflets, 4in. to 6in. long and ½in. to 1in. broad, are of two distinct forms, the lower ones being barren, opposite, somewhat spear-shaped, and toothed at the edges. The upper portion only of the fully-developed fronds is fertile, differing in that respect, as well as in general appearance, from all other known species. The fertile leaflets, which are also opposite, are longer and narrower than the barren ones; their lobes are much deeper, and each of these is terminated by a single sorus (spore mass), situated at its extreme point (hence the name *davallioides*). This is a Fern which should be in every collection; for covering walls of large dimensions or for planting on dead Tree Ferns it has no equals; a good specimen of it makes an exhibition plant of particularly attractive appearance, as the barren and fertile portions of its fronds are as distinct as those of the better-known *Asplenium biforme*. The spore masses are covered by a kidney-shaped involucre.—*Hooker*, *Species Filicum*, iv., p. 155; *Filices Exoticæ*, t. 60. *Nicholson*, *Dictionary of Gardening*, ii., p. 445. *Lowe*, *Ferns British and Exotic*, vii., tt. 23 and 24.

N. d. furcans—fur′-cans (forked), *Moore*.

Among the many crested Ferns in cultivation, this singular as well as beautiful form, introduced into European gardens by Messrs. J. Veitch and Sons, through Messrs. J. Baptist and Sons, of Sydney, New South Wales, is one of the most distinct and most highly decorative. So different indeed is it from the type, that it is questionable whether the plant really is a form of *N. davallioides*, although such was Moore's decided opinion. Yet the most essential characteristic—that of the fructification being disposed at the extreme point of the lobes of the fertile leaflets—is altogether absent, the barren and the fertile leaflets are of the same nature, and there is no contraction noticeable; finally the whole habit of the plant is also thoroughly distinct. *N. d. furcans* is of equally robust growth, but its handsome, arching fronds, 3ft. to 4ft. long, 8in. broad, and of a more massive appearance, are produced in great abundance from an agglomeration of crowns. Its most distinct characteristic is the furcation of the leaflets (Fig. 144), which are either alternate or opposite and closely set along the midrib, whereas those of *N. davallioides* are set much

farther apart. In the barren leaflets, which in fully-developed plants are situated only on the lower portion of the frond, and which generally are few in number, the furcation is less marked and sometimes only rudimentary; in the fertile leaflets it is twice or even three times repeated at the extremities

Fig. 144. Portion of Frond and detached Fertile Pinna of Nephrolepis davallioides furcans
(Portion of Frond, ½ nat. size; detached Pinna, nat. size).

of the first divisions, becoming more complex towards the summit of the frond, where it often forms quite a large tassel, whose weight gives the fronds an elegant, pendulous habit.—*Nicholson, Dictionary of Gardening*, ii., p. 445.

This plant is valuable for growing in large baskets, in which it never fails to prove very attractive. Although spores are freely produced, it is best

to propagate *N. d. furcans* by means of the young plants produced from rhizomes in the ordinary way, on account of the numerous and extreme variations which take place among the seedlings, a small percentage only of which are possessed of the true characters of the parent.

N. d. f. plumosa—plu-mo′-sa (feathery), *May.*

This, no doubt, is the most distinct of the numerous forms raised from the above-named variety. It is of smaller dimensions and much more compact habit, its fronds being repeatedly forked at their summit and ending in large tassels of a crested and feathery nature.

Fig. 145. Nephrolepis Duffii, showing Habit and Upper Portion of detached Frond

(Habit, much reduced; Portion of Frond, ½ nat. size).

N. Duffii—Duf′-fĭ-i (Duff's), *Moore.*

This pretty, neat-habited, stove species, native of the Duke of York's Island, in the South Pacific Ocean, is undoubtedly one of the most interesting of the whole genus. Its compact habit, its comparatively small dimensions, and the bright glossy colour of its beautifully-tasselled fronds, give it a prominent place in a group of Ferns naturally rich in decorative subjects. Its curious, irregularly-pinnate fronds are borne on slender stalks covered with reddish-brown, downy scales at their base. Instead of these fronds being produced loosely, as in most other Nephrolepises, they are densely crowded—the outcome of closely-clustered crowns; they seldom measure more than 2ft. in length, and are terminated by very handsome crests, which vary in size according to the temperature in which the plant is grown. We have frequently heard complaints of the fronds being simply forked (Fig. 145), when the same plants, after being subjected to a greater amount of heat and moisture, produced fronds very heavily tasselled, the plant then assuming an

Nephrodium Leuzeanum

(much reduced).

elegant, vase-shaped appearance (see Plate). In fact, nothing short of the moist heat of a stove will induce it to show its characters in their best condition. The leaflets, which are usually small, of various sizes, rounded at the summit and toothed at the edges, are produced in pairs, one overlying the other, and, curiously enough, those on the upper side are the largest; their disposition is irregular, the pairs being sometimes opposite, but mostly alternate, distant towards the base, approximate higher up, and imbricated (quite overlapping) in the crested portion of the fronds.—*Nicholson*, *Dictionary of Gardening*, ii., p. 445.

Being a totally barren plant, *N. Duffii* can only be propagated by division of the crowns, an operation easily performed at almost any time of the year, but with greater safety in early spring; or by young plants produced from the rhizomes, which, however, are not so plentiful as in other species. It is one of the best Ferns for pot culture, its somewhat upright habit making it less suitable than other species for baskets, brackets, and wall-coverings.

N. ensifolia—en-sif-ol′-ĭ-a (sword-fronded). Synonymous with *N. acuta.*

N. exaltata—ex-al-ta′-ta (lofty), *Schott.*

Though one of the commonest of the whole genus, this stove species is very justly also one of the most popular. From Lowe's description and particulars, we gather that it was introduced by Mr. Anderson to the Royal Gardens, Kew, in the year 1793. Its range of habitat is very extensive: Beddome, in his "Ferns of Southern India," gives it as a native of Wynad, the Anamallays, and Neilgherries. Eaton, in the "Ferns of North America," states (vol. ii., p. 130) that it is found growing on decomposing vegetable matter and on the trunks of trees, particularly the Cabbage Palmetto, in South Florida, and adds that it is also found in Mexico, the West Indies, Central and South America, South Asia, China, the Pacific Islands, Australia, and part of Africa. Its fronds, 2ft. or more long and 3in. to 6in. broad, are borne on tufted, firm stalks 4in. to 6in. long, of a naked or slightly scaly nature. The leaflets, of a somewhat leathery texture, are 1½in. to 3in. long, ¼in. to ½in. broad, and usually sharp-pointed, with the edge entire or slightly toothed, the upper side eared, and the lower rounded at the base (Fig. 146, reduced from Col. Beddome's "Ferns of Southern India," by the kind permission of the author). The sori (spore masses), disposed near the margin of the leaflets,

are covered with a firm and distinctly kidney-shaped involucre.—*Hooker*, *Species Filicum*, iv., p. 152. *Nicholson*, *Dictionary of Gardening*, ii., p. 445. *Beddome*, *Ferns of Southern India*, t. 93. *Eaton*, *Ferns of North America*, ii., t. 63.

For indoor decoration, as well as for general use, *N. exaltata* has no equal, and being of a particularly accommodating nature it thrives well under other Ferns in places which possibly would otherwise remain bare. It is also well adapted for planting on a cool rockery, either in out-of-the-way corners or on rocks near water; but, wherever it is planted, care should be taken to

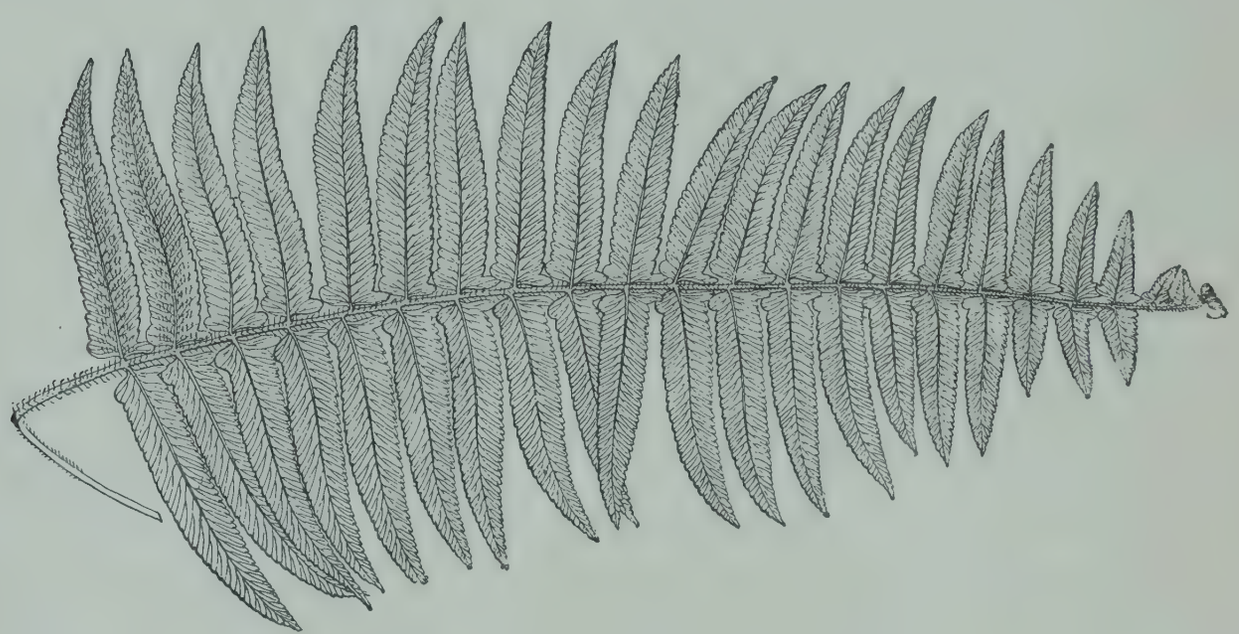


Fig. 146. Frond of Nephrolepis exaltata
(much reduced).

give it plenty of room, so as to ensure the full development of its beautiful fronds. *N. exaltata* is a rapid grower, and soon forms very ornamental masses when planted out; but when left alone it has a tendency to overrun any more delicate Ferns which may happen to be near it.

N. e. hirsutula—hir-su′-tul-a (covered with small hairs), *Presl.*

Eaton, in his "Ferns of North America," referring to this plant, says (vol. ii., p. 130): "The hirsute form is more common in India, China, and Polynesia, but it is found also in several parts of Tropical America." It is grown less extensively than other kinds, probably on account of the softness of its foliage, which is densely covered with short, soft hairs of a peculiar

greyish hue, thus giving the whole plant quite a distinct appearance.—*Nicholson, Dictionary of Gardening*, ii., p. 445. *Lowe, Ferns British and Exotic*, vii., t. 21.

N. e. neglecta—ne-glec′-ta (untrimmed), *Kunze.*

A singular form, reminding one, by the strange way in which the leaflets are set, of some of the depauperated and cruciated forms of our British Polystichums and Athyriums (Aspidiums and Aspleniums). The fronds, which vary in length from 1ft. to 2ft., have a peculiarly narrow appearance produced by the nature of their leaflets, some being cordate (heart-shaped), some cruciate (in the form of a cross), and some again almost triangular; they are set somewhat far apart on a thick, round, and slightly scaly stalk. These leaflets, however, possess the advantage of being much more securely attached to the midrib than those of any of the other kinds belonging to the genus, and are not so easily affected by want of water at the roots. The sori (spore masses) are covered with a nearly round involucre attached to the frond by its centre. This is not a good Fern for pot or for basket culture, but it is very striking when planted on the rockery, where it grows in fine masses.

N. e. volubilis—vol-u′-bil-is (twining), *J. Smith.*

A straggling, flexuose (zizgag-bending) form, of South American origin; it is more remarkable for its peculiar habit than on account of its beauty.

N. falciformis—fal-cif-or′-mis (sickle-formed), *De Vriese.*

A handsome, stove species, native of Borneo, with fronds of somewhat upright habit, 1½ft. to 2ft. long, comparatively narrow, and furnished with numerous leaflets, the lower of which are barren, being somewhat oblong, the upper fertile ones being narrowly sickle-shaped, sharp-pointed, thrown back, 1½in. long, ½in. broad, and slightly eared at the base on the upper margin. The sori (spore masses) are not marginal, but are disposed in one row halfway between the midvein and the edge.—*Nicholson, Dictionary of Gardening*, ii., p. 445.

N. floccigera—floc-cig′-er-a (bearing little tufts of wool), *Moore.*

This strong-growing, stove species, native of Java and the Celebes, somewhat resembles *N. exaltata* in habit, but is easily distinguished from that

species through the distinctly notched character of its leaflets and the disposition of its sori (spore masses), which are placed at the tips of the lobes. Its fronds, 2ft. to 3ft. long and 8in. to 12in. broad, are furnished with leaflets 4in. to 6in. long, about ½in. broad, sharp-pointed at their extremity, and deeply notched along their edges. They are of a somewhat leathery texture, and the spore masses are covered by a firm, kidney-shaped involucre.—*Hooker*, *Species Filicum*, iv., p. 155.

N. hirsutula—hir-su′-tul-a (slightly-hairy). A variety of *N. exaltata.*

N. imbricata—im-bric-a′-ta (overlapping). Synonymous with *N. cordifolia.*

N. neglecta—ne-glec′-ta (untrimmed). This is a variety of *N. exaltata.*

N. obliterata—ob-lit-er-a′-ta (forgotten). A synonym of *N. ramosa.*

N. obtusifolia—ob-tu-sif-ol′-ĭ-a (blunt-leaved). This is synonymous with *N. cordifolia.*

N. pectinata—pec-tin-a′-ta (comb-like). A very distinct variety of *N. cordifolia.*

N. philippinensis—phil-ip-pi-nen′-sis (from the Philippine Islands), *Moore.*

This lovely and most distinct species, of comparatively small dimensions and compact habit, succeeds equally well under either stove or greenhouse treatment. It is entirely distinct from all other known species, inasmuch as its narrow fronds, seldom exceeding 1ft. in length, are quite erect and produced from thickly-tufted crowns. On each side of the midrib, which is of a bright shining brown colour, are the leaflets, set very closely together, and affecting a deflexed position ; they are of a pleasing dark green colour, leathery in texture, strongly eared at the base, and finely toothed at the edges. The curious position of the leaflets and the upright habit of the whole plant make it a most interesting Fern.

N. platyotis—plat-ў-o′-tis (broad-eared). Synonymous with *N. acuta.*

N. pluma—plu′-ma (feather-like), *Moore.*

This very handsome, greenhouse species, native of Madagascar, is deciduous, being deprived of its foliage from October to the beginning

of March. Its beautifully-pendulous fronds, 4ft. to 5ft. long, 4in. broad, and simply pinnate (once divided to the midrib), are borne on slender, round stalks, whose base is totally deprived of leaflets for at least 8in.; higher up the leaflets are closely set on each side of the midrib, generally numbering from eighty to a hundred each side in the largest fronds. These leaflets, of a soft texture, are usually sickle-shaped, broadest at the base, which is slightly eared, and taper to an attenuated point; they are about 2in. long and have their margins notched in a series of oblique crenatures, a characteristic peculiar to this species. The fronds are thus 4in. broad, and when produced in large numbers, which is the case in strong plants, they have an elegant appearance, especially when the plants are grown in suspended baskets. The sori (spore masses) are transversely set at the end of the anterior venule (veinlet), being disposed one to each notch.—*Nicholson*, *Dictionary of Gardening*, ii., p. 446.

N. pluma being thoroughly deciduous, care must be taken to keep its tubers, which are of a somewhat woody character and of a dark brown colour, in a constantly but moderately moist soil during the resting period, which corresponds with our own winter, otherwise they will shrivel up, and the plant will be lost.

N. plumosa—plu-mo′-sa (feathery). This is a sub-variety of *N. davallioides furcans.*

N. punctulata—punc-tul-a′-ta (small-dotted). Synonymous with *N. acuta.*

N. ramosa—ra-mo′-sa (branched), *Moore.*

A stove species, of small dimensions, native of Western Tropical Africa, Ceylon, the Philippines, Australia, Samoa, Fiji, &c. Its fronds, 6in. to 12in. long and 1in. to 3in. broad, are borne on very short stems disposed on wide-creeping rhizomes (prostrate stems) of a wiry nature. The leaflets, of a soft, papery texture, ½in. to 1½in. long, and ¼in. to ½in. broad, are slightly notched; their upper edge is auricled (eared) and parallel with the stalk, while the lower one is oblique. The sori (spore masses) are covered with a roundish involucre of a very fugacious nature. The name *ramosa* is rather misleading, as the fronds are not branched. This species is also known as *N. obliterata* and *N. trichomanoides.*—*Hooker*, *Species Filicum*, iv., p. 154. *Nicholson*, *Dictionary of Gardening*, ii., p. 446.

N. rufescens—ru-fes′-cens (reddish), *Presl.*

Although considered by the authors of the "Synopsis Filicum" as simply a variety of *N. acuta*, this remarkably handsome plant appears to be sufficiently distinct to rank as a species. The upright habit of its fronds, 2ft. to 3ft. long, the rusty-coloured woolly nature of their stalks and of the under-surface of the leaflets, and the deeply-cleft character of the leaflets, render the plant of more interest, in our opinion, than a mere variety of *N. acuta*. The leaflets overlap one another and are cut down, especially on the lower side, into deep, lanceolate (spear-shaped) segments, which in their turn are deeply and conspicuously notched. The sori (spore masses) are nearly round, situated immediately within the margin of the lobes, and covered with a kidney-shaped involucre.—*Hooker*, *Synopsis Filicum*, p. 301. *Nicholson*, *Dictionary of Gardening*, iv., p. 573.

N. r. tripinnatifida—trip-in-na-tif′-id-a (three times divided nearly to the midrib), *Baker.*

This free-growing, handsome, stove variety, is one of the most distinct and beautiful of all the strong-growing kinds, and is a native of the Fiji Islands. Its fronds, like those of *N. rufescens*, have a particularly upright habit, and are 2ft. to 3ft. long and 4in. to 6in. broad ; they are of a lovely bright green colour, which forms a pleasing contrast with the reddish tint of their rachis (stalk of the leafy portion). They possess a peculiarly massive, yet feathery appearance, produced by the broad leaflets, of a soft, papery texture, being regularly and constantly tripinnatifid (three times divided nearly to the midrib), their margins being on both sides deeply cleft and covering each other in a graceful and most effective manner (see Plate), much in the way of the better-known and very popular "Welsh Polypody" (*Polypodium vulgare cambricum*).—*Nicholson*, *Dictionary of Gardening*, iv., p. 573.

This variety is very useful either for pot culture or for planting out in the warm Fernery. Unfortunately, like nearly all plumose forms of species of Ferns already in cultivation, it has, until now, proved entirely barren ; but, being provided with the wiry, running rhizomes (prostrate stems) peculiar to the genus, it may be easily propagated by the same method as that employed for commoner kinds, which produce young plants on their rhizomes at intervals.

N. splendens—splen′-dens (splendid). Synonymous with *N. acuta.*

N. trichomanoides—trich-om-an-ŏ-i′-dēs (Trichomanes-like). A synonym of *N. ramosa.*

N. tuberosa—tu-ber-o′-sa (tuberous-rooted).

This is the common garden name for *N. cordifolia*, and by far the more popular of the two. The species was so named by Presl, who describes it in his "Tentamen Pteridographiæ"; Kunze and Moore, in their respective works "Index Filicum," retain the name *tuberosa;* and Lowe, in his excellent work "Ferns British and Exotic" (vii., p. 45), states that it is also found in J. Smith's "Catalogue of Ferns cultivated in British Gardens."

N. undulata—un-dul-a′-ta (wavy), *J. Smith.*

This comparatively dwarf, stove species, native of Sierra Leone, West Africa (whence, according to Lowe, it was introduced into the Royal Gardens, Kew, in the year 1848, by the Right Hon. the Earl of Derby), is exceedingly handsome, especially when in fructification. Its fronds, which are of an arching but not drooping habit, seldom exceed 1¼ft. in length; they are narrowly spear-shaped, and furnished with narrow-oblong, pointed leaflets of a thin, papery texture, notched at the edges, and of a cheerful light green colour.—*Lowe, Ferns British and Exotic*, vii., t. 20.

Like *N. cordifolia* and *N. pluma*, this species produces small tubers, from which it can easily be propagated after its resting period. It is very scarce in collections, owing, doubtless, to its being of deciduous habit, which often causes it to be accidentally thrown away during its resting time.

N. volubilis—vol-u′-bil-is (twining). A variety of *N. exaltata.*

N. Zollingeriana—Zol-lin-ger-ĭ-a′-na (Zollinger's), *De Vriese.*

A Malayan species, of somewhat upright and stiff habit, differing from most other kinds through its leaflets being so deeply toothed as to appear bipinnatifid; they are set a little way apart on round stalks of a woolly nature, green in the early stage of development, but turning with age to a dark brown colour. The fronds, of medium dimensions, and seldom attaining more than 1½ft. in length, are of a cheerful light colour. The rhizomes (prostrate stems) are freely produced and extend a long way from the plant.

The sori (spore masses), disposed in a single row about half-way between the midvein and the margin, are covered by a nearly round involucre of a fugacious nature.—*Lowe, Ferns British and Exotic*, vii., p. 46.

This variety thrives best when planted in rockwork, in either a warm or an intermediate temperature.

NIPHOBOLUS—Niph-ob′-ol-us. *See* **Polypodium.**

NIPHOPSIS—Niph-op′-sis. *See* **Polypodium.**

CHAPTER XLIV.

NOTHOCHLÆNA, *R. Brown.*

(Noth-och-læ′-na.)

Gold and Silver Maidenhair Ferns.

THE name of this genus is frequently but incorrectly spelt *Nothoclæna;* it is derived from *nothos*, spurious, and *chlaina*, a cloak, on account of the covering of the spore masses with which some species appear to be provided. *Nothochlæna*, which in Hooker and Baker's "Synopsis Filicum" is Genus 50, forms an important part of the tribe *Grammitideæ*. The plants are closely related to *Cheilanthes*, from which they differ only by the absence of a distinct involucre, and with which they are connected by gradual intermediate stages. The genus is divided into *Nothochlæna* proper, with fronds densely matted beneath, and *Cincinalis* of Desvaux, the fronds of which are coated on their under-side with white or yellow powder. The learned Dr. Fée, in speaking of this coloured powder, says: "L'exudation jaune, blanche, ou rose qui couvre la lame inférieure de ces plantes est de nature céracée, et cette sorte de cire végétale et soluble dans l'alcool et l'ether. Elle est produite par des glandes en massue et présente sous le microscope l'aspect de petits filaments d'une ténuité extrême"* (Eaton, "Ferns of North America," i., p. 67).

The plants belonging to this genus are widely dispersed, some being found in Southern Europe, in North and South America, in China, in

* "The yellow, white, or pink exudation which covers the under-surface of the fronds of these plants is of a ceraceous (waxy) nature, and this sort of vegetable wax is soluble in alcohol and in ether. It is produced by club-shaped glands, and presents, under the microscope, the aspect of small filaments of great tenuity."

India, &c. They are easily recognised by their sori (spore masses) being marginal, oblong or roundish at first, but soon becoming confluent into a continuous, marginal line, and by the total absence of involucre (covering of spore masses), although the frequently inflexed nature of the edge of their fronds gives them an appearance of being involucrate. There are no British representatives.

Culture.

Some of the members of this genus require stove temperature all the year round, while others succeed best under greenhouse treatment. In that respect they are like Gymnogrammes and Cheilanthes, which, on account of either the woolly or the golden or silvery nature of the under-side of their foliage, they also resemble in general appearance. It is not even unusual to find on the same plant fronds the under-sides of which are adorned with quite different colours—white, creamy, pale or deep yellow. In a Natal species the under-side is wholly covered with a pinkish-coloured meal, but, unfortunately, up to the present time this singular and interesting plant is only known through dried specimens (Eaton, "Ferns of North America," i., p. 67). A few of them, through their slender, ebony-back, shining stalks and small pinnules (leafits), have much the appearance of certain Adiantums; and one often finds that inquiries respecting Gold and Silver Maidenhairs, although such things exist, usually apply to *N. flavens* and *N. nivea*.

Most of the plants belonging to this genus are of a somewhat delicate nature, requiring more than usual care, especially during the winter, to preserve their foliage, which, from its constitution, in many cases possesses the property of retaining moisture and is therefore apt to decay. An important fact to notice is that, from whatever part of the globe they come, all the Nothochlænas are invariably found on rocks much exposed to the sun, but so situated that the plants get a good supply of moisture at the roots. The majority of the species are of erect or semi-erect habit, although a few are particularly well adapted for growing in baskets of small or medium dimensions, in which they display their elegant fronds to advantage. In any case they should not be kept in a close or moist place, a somewhat airy situation being indispensable to all of them. If grown in pots, a mixture of

good fibrous peat and small pieces of sandstone in about equal proportions is all that is required ; but great care must be taken to ensure perfect drainage, as stagnant water at the roots is highly injurious. Finely-sifted soil should be carefully avoided, as also should overhead syringings.

Nothochlænas are almost invariably propagated from spores, which, in some cases, germinate freely, but many of the species may also be increased by division of the crowns, which operation is best performed from March to May.

Principal Species and Varieties.

N. (Cincinalis) affinis—Cin-cin-a′-lis ; af-fi′-nis (related), *Hooker.*

A stove species, of small dimensions, native of Mexico and Guatemala. The fronds, 4in. to 5in. long and about 1in. broad, are bipinnatifid (twice divided nearly to the midrib), and borne on tufted, glossy, nearly black, wiry stalks 2in. to 3in. long. The short-stalked leaflets, triangular-oblong, ½in. long, and ¼in. broad, are deeply cleft into close, entire lobes, the lower ones distant and dwindling down gradually. The fronds are of a somewhat leathery texture ; their upper surface and their stalks are naked, while their lower surface is densely matted with sulphur-coloured meal. The brownish sori (spore masses) are disposed on the margins of the lobes.—*Hooker*, *Species Filicum*, v., p. 109.

N. Brackenridgei—Brack-en-ridg′-ĕ-i (Brackenridge's), *Baker.*

In this greenhouse species, which is a native of Peru, the fronds are produced from a thick rhizome (prostrate stem) clothed with spear-shaped scales of a rusty colour ; they are oblong-spear-shaped, 4in. to 5in. long, tripinnatifid (three times divided nearly to the midrib), and borne on glossy, nearly naked stalks 3in. to 4in. long and of a chestnut-brown colour. The distinctly-stalked, triangular-oblong leaflets are cut down to the stalk into triangular-oblong pinnules (leafits) with rounded lobes. The fronds are of a thick, leathery texture, their dark green upper surface being nearly naked, while their lower one and the rachis (stalk of the leafy portion) are densely clothed with small, narrow scales of a dark chestnut-brown colour. The sori (spore masses) are of a brownish colour, and have their edges slightly inflexed. —*Hooker*, *Synopsis Filicum*, p. 371.

N. Buchanani—Bu-chan-a′-ni (Buchanan's), *Baker.*

A greenhouse species, of small dimensions, native of Natal, with fronds simply pinnate (only once divided to the midrib), being formed of two or three pairs of distinct leaflets below the terminal one, the lowest much the largest. These fronds, which seldom exceed 2in. in length and 1½in. in breadth, are borne on tufted, slender stalks 3in. to 4in. long, of a woolly nature and bright chestnut-brown colour; they are of a soft, papery texture, and their stalks, as well as both surfaces of their fronds, are densely clothed with whitish or rusty-brown hairs, which, though copious, are not matted. The abundant brownish sori (spore masses) are disposed right along the margin of the lobes.—*Hooker*, *Synopsis Filicum*, p. 373.

N. canariensis—can-a′-rĭ-en′-sis (from the Canary Islands).

The lovely Fern found in gardens and in most catalogues under this name (for which we can find no authority) is a native of Teneriffe and the Cape de Verde Islands. Its fronds, 12in. to 20in. long, including the stalks, are abundantly produced from a thick and fleshy rhizome (prostrate stem), remaining well above the surface of the ground and entirely covered with large, silky scales of a light brown or reddish colour. They are broadly spear-shaped and bipinnate (twice divided to the midrib), with blunt pinnules (leafits) closely set together. The upper surface is of a dull green colour, while the under-side, the stalks, and the rachis are densely clothed with long, reddish-brown hairs, under which the sori (spore masses), although very abundant and intensely black, are scarcely perceptible.

N. (Cincinalis) candida—Cin-cin-a′-lis; can′-did-a (white), *Mettenius.*

By the authors of the "Synopsis Filicum" this is considered only as a variety of *N. sulphurea.* In his excellent and exhaustive work on "Ferns of North America," however, Eaton, who gives it as *N. candida* of Hooker, accords it specific rank, and states that it is found in a natural state growing in crevices of rocks, often in places much exposed to the direct rays of the sun, from Western Texas and New Mexico to San Diego County, California, and southward to Peru. He adds that the Collectors of the Mexican Boundary Survey found it in Lower Rio Grande and on the Pecos of the San Pedro. In general aspect it resembles some of the Cheilanthes, as the margin of its

pinnules (leafits) is slightly recurved, though it does not form a true involucre, such as is seen in the well-known *C. farinosa*, for instance, a Fern otherwise much like this species. In perfectly-developed plants the fronds of *N. candida* are broadly triangular in outline and bipinnate (Fig. 147), the leafy portion scarcely measuring 4in. in length. Another very noticeable character peculiar to this species consists in the extension of the lowest leaflets, which are much the broadest, from the fact that the basal pinnules (leafits) on the lower side are much longer than the corresponding ones on the upper side, and are divided. The upper surface is of a dull green colour, but copiously sprinkled with minute, stalked, whitish glands; the underside is covered with white or yellowish, ceraceous powder, except on the black and shining midribs. The dark brown sori (spore masses) are situated just within the margin.—*Eaton, Ferns of North America*, i., t. 9.

Fig. 147. Frond of Nothochlæna candida (⅓ nat. size).

N. (Cincinalis) chilensis — Cin-cin-a′-lis; chil-en′-sis (Chilian), *Hooker*.

A greenhouse species, of small dimensions, native of Juan Fernandez Island. Its somewhat egg-shaped fronds, 3in. to 4in. long and 2in. broad, borne on tufted, stout, glossy stalks of a chestnut-brown colour and nearly naked, are tripinnate (three times divided to the midrib). The triangular leaflets are distantly disposed, and their pinnules (leafits), of similar shape, are stalkless; the ultimate segments are oblong and very narrow, of a somewhat leathery texture, and sometimes very deeply cleft. The upper surface, of a pale green colour, is naked, while the under-side is densely coated with white powder. The spore masses are brown.—*Hooker*, *Species Filicum*, v., p. 112, t. 286A.

N. (Cincinalis) chrysophylla—Cin-cin-a′-lis; chry-soph-yl′-la (golden-fronded). A synonym of *N. flavens*.

N. cinnamomea—cin-nam-o′-mĕ-a (cinnamon-coloured), *Baker.*

In this stove species, native of Guatemala, the fronds are borne on tufted stalks 1in. to 5in. long and at first densely clothed with soft hairs of a pale brown colour; they are oblong-spear-shaped, 3in. to 4in. long, about 2in. broad, and twice or three times divided to the midrib. The stalkless, spear-shaped leaflets, ¼in. to ½in. long, are divided into blunt, oblong pinnules (leafits) of a soft texture, and clothed on their under-side with loose, pale brown hairs. The brown sori (spore masses) are disposed in a continuous line along the margin of the pinnules.—*Hooker, Synopsis Filicum*, p. 515.

N. (Cincinalis) dealbata—Cin-cin-a′-lis; dĕ-al-ba′-ta (whitened), *Kunze.*

This very elegant little plant, of slender habit, is a native of North America, and requires cool treatment. Eaton says that "it is found in wild state, growing in the crevices of rocks on the banks of the Missouri River, about 50 miles above its confluence, in Arizona, Texas, New Mexico, and Southern Kansas, where it is somewhat plentifully growing on the perpendicular faces of calcareous rocks, and especially where sheltered by overhanging projections." The fronds, borne on slender, wiry, chestnut-brown stalks 4in. to 6in. long, are deltoid (in shape of the Greek delta, Δ), 3in. to 4in. each way, and tripinnate (three times divided to the midrib), their distant leaflets being again divided into blunt, oblong lobes of a somewhat leathery texture; they are of a pale green colour on their upper surface, while the under-side is coated with pure white powder.—*Hooker, Species Filicum*, v., p. 113. *Eaton, Ferns of North America*, i., t. 9.

N. deltoidea—del-toid′-ĕ-a (deltoid), *Baker.*

This is the smallest species at present known; it is a native of Mexico, and thrives best under cool treatment. Its little fronds, in shape of the Greek delta, Δ, borne on densely-tufted stalks of a pale brown colour and clothed throughout with spear-shaped, whitish scales, are seldom more than 1½in. in length, and are composed of from three to seven blunt lobes of a thick and somewhat leathery texture, dull green and nearly smooth on their upper surface, but provided on the under-side with overlapping scales similar to those with which the stalks are covered. The sori (spore masses) are entirely hidden by these scales.—*Hooker, Synopsis Filicum*, p. 514.

N. distans—dis′-tans (distant), *R. Brown.*

This little gem, which, according to Lowe, was introduced into England in 1823, and raised from spores in the Royal Gardens, Kew, in 1836, is now seldom met with in British collections; it is a greenhouse species, native of Australia, New Zealand, and New Caledonia. The narrow-spear-shaped fronds, 6in. to 9in. long and bipinnate (twice divided to the midrib), are borne on densely-tufted, wiry stalks, clothed with narrow scales of a rusty colour. The triangular leaflets are cut down into slightly-lobed pinnules (leafits) of a somewhat leathery texture, slightly hairy, pale green on their upper surface, and more or less densely coated on the under-side with long, narrow, rusty-coloured scales. The leaflets, which are often much curled, have their edge incurved.—*Hooker*, *Species Filicum*, v., p. 114; *Second Century of Ferns*, t. 80. *Nicholson*, *Dictionary of Gardening*, ii., p. 455. *Lowe*, *Ferns British and Exotic*, i., t. 19B.

N. Eckloniana—Eck-lon-ĭ-a′-na (Ecklon's), *Kunze.*

One of the handsomest species of the whole genus, yet at the same time one which remains comparatively rare in cultivation, although, according to Lowe, it was first sent to the Royal Botanic Gardens, Kew, by Mr. D. Cameron, in the year 1843. The plant is a native of Cape Colony and Natal, and on that account no doubt it is generally treated as a stove plant and with very bad results. It succeeds best in a greenhouse, where it proves most attractive, principally on account of the different colours of the scales which cover the under-side of its fronds. These fronds are 6in. to 12in. long, 2in. to 3in. broad, bi- or tripinnatifid (twice or three times divided nearly to the midrib), and borne on strong, erect, scaly stalks 3in. to 6in. long. The upper leaflets are closely set, the lower ones are more distant, and the close, spear-shaped pinnules (leafits) are again divided into oblong segments. The fronds are of a thick, leathery texture, smooth and pale green on their upper surface, while the under-side is densely clothed with scales of a silky texture, white in young fronds, but of a light brown colour in mature ones. The sori (spore masses) are disposed in a single row on each segment, and are somewhat concealed by the margin of the segments being revolute.—*Hooker*, *Species Filicum*, v., p. 116. *Nicholson*, *Dictionary of Gardening*, ii., p. 445. *Lowe*, *Ferns British and Exotic*, i., t. 17A.

N. eriophora—er-ĭ-oph-o′-ra (wool-bearing), *Fée.*

This stove species, very distinct through its habit, which much resembles that of a Doryopteris, is a native of South Brazil. Its deltoid fronds (in shape of the Greek delta, Δ), 2in. to 3in. each way, are borne on slender, tufted stalks 3in. to 4in. long, of a wiry nature, dark chestnut-brown, and more or less hairy; they are formed of three or four blunt, narrow-oblong, entire lobes on each side, the lowest pair much the largest, deeply cleft on the lower side. The fronds are very thick, and the under-surface is densely matted with yellowish-brown wool. The abundant sori (spore masses) are disposed on the margin.—*Hooker*, *Species Filicum*, v., p. 229.

N. (Cincinalis) Fendleri—Cin-cin-a′-lis; Fend′-ler-i (Fendler's), *Kunze.*

One of the most ornamental of the several North American species in cultivation. It thrives well under cool treatment, being found wild in clefts of exposed rocks from the mountains of Colorado to Texas, New Mexico, and Arizona. In habit the plant is very peculiar; the general outline of its fronds, which are tripinnate (three times divided to the midrib), and borne on densely-tufted, wiry, chestnut-brown, polished stalks 2in. to 3in. long, is broadly triangular, being nearly as broad as long. The main rachis (stalk of the leafy portion) and the primary and secondary branches are singularly flexuous, being bent at an obtuse angle alternately to right and left: thus the branches are never opposite or in pairs, but almost uniformly alternate. The leaflets, leafits, and segments are all distinctly stalked; their upper surface is of a glaucous (bluish) green, while their under-surface is covered with a dense, white powder. All the branches and branchlets are dark brown and smooth, like the stalks, and they are so much refracted and divaricated that the several fronds on one plant, as is frequently the case in Pellæas, are generally much entangled and very difficult to separate without injury.—*Hooker*, *Species Filicum*, v., p. 113. *Eaton*, *Ferns of North America*, i., t. 9.

N. ferruginea—fer-ru-gin′-ĕ-a (rusty), *Hooker.*

An old inhabitant of our gardens. Although a native of the West Indies and Mexico, and found also along the Andes of Chili, it is generally imported from North America, where it grows abundantly in rocky places along the Rio San Pedro and Rio Grande, in Texas, and in New Mexico, where it is

PTERIS CRETICA MAYI

abundant on calcareous rocks and also on the ground. The plant is of erect habit, and, although of a somewhat stiff appearance, is nevertheless very interesting through its fronds, 6in. to 12in. long and simply pinnate (only once divided to the midrib), being borne on black, upright stalks 2in. to 4in. long, of a wiry nature. The leaflets are ¼in. to ½in. long, egg-shaped, deeply cleft into blunt lobes, stalkless, and of a leathery texture. The upper surface has a greyish-green appearance, produced by a fine, hairy pubescence (down), while the under-side shows a dense covering of fine, woolly hairs, which are sometimes nearly white, at other times, especially in mature fronds, of a light rusty-brown colour. The abundant black sori (spore masses) are situated at the slightly-recurved margins of the lobes, and thus appear as if furnished with an involucre.—*Hooker*, *Species Filicum*, v., p. 108; *Second Century of Ferns*, t. 52. *Eaton*, *Ferns of North America*, i., t. 39.

N. (Cincinalis) flavens—Cin-cin-a′-lis; fla′-vens (yellow), *Moore.*

This very elegant, South American species, better known in gardens under the name of *N. chrysophylla*, is one of the best-known and most popular of the whole genus. It possesses various qualities which render it attractive and of decorative value to all Fern-growers. The plant is graceful in appearance, and the bright golden powder with which the under-surface of its abundant Adiantum-like fronds is covered, forms a pleasing contrast with the slender, black, shining stalks on which they are borne: on this account the plant is usually, though erroneously, called "Golden Maidenhair." It thrives best in a basket, and should be kept close to the light and in a warm house, at least during the winter. The fronds, which are tripinnate (three times divided to the midrib), and borne on densely-tufted, glossy, chestnut-brown stalks 4in. to 8in. long, are produced from a thick rhizome (prostrate stem) covered with dark brown scales; they are 4in. to 9in. long, 2in. to 4in. broad, broadly triangular, and furnished with leaflets disposed somewhat far apart. The pinnules (leaflits) are somewhat loosely set, nearly wedge-shaped, of a slightly leathery texture, and of a bright green colour on their upper surface, while their under-side is densely covered with a bright yellow powder. The brown sori (spore masses) extend from the edge nearly to the midrib.—*Hooker*, *Species Filicum*, v., p. 146; *Filices Exoticæ*, t. 47. *Nicholson*, *Dictionary of Gardening*, ii., p. 455. *Lowe*, *New and Rare Ferns*, t. 8.

N. fragilis—frag′-il-is (fragile), *Hooker*.

A distinct, greenhouse species, native of Arnhem, Tropical Australia. Its triangular fronds, 1½in. to 3in. each way, are borne on very slender, naked, glossy stalks 3in. to 4in. long and of a dark chestnut-brown colour; they are twice pinnate, and their leafits are again divided into oblong segments of a soft, papery texture, and densely coated on both surfaces with grey, spreading hairs. The small and abundant sori (spore masses) have their edge slightly recurved.—*Hooker*, *Species Filicum*, v., p. 114, t. 287A.

N. Fraseri—Fra′-ser-i (Fraser's), *Baker*.

This greenhouse species, native of Tucuman and Argentine territory, produces from a firm, short-creeping rhizome (prostrate stem), covered with minute, spear-shaped scales, its spear-shaped fronds, which are borne on slender, naked, brownish-black stalks 4in. to 6in. long. These fronds are 4in. to 6in. long, 1½in. to 2in. broad, and bipinnatifid (twice divided nearly to the midrib), being furnished with ten to fifteen pairs of spear-shaped leaflets cut down nearly to the rachis (stalk) into blunt, oblong lobes, short-stalked and distant in the lower part of the fronds, closer and stalkless in the upper portion. The fronds are of a somewhat leathery texture, dull green on their upper surface, and densely matted with pale brown scales on their under-side. The chestnut-coloured sori (spore masses) finally emerge from amongst the scales. —*Hooker*, *Synopsis Filicum*, p. 514.

N. Gillesii—Gil-les′-ĭ-i (Gilles'). A synonym of *N. squamosa*.

N. hirsuta—hir-su′-ta (hairy), *Desvaux*.

In this stove species, which is a native of Hong-Kong and Polynesia, the oblong-spear-shaped fronds, 6in. to 8in. long, 1½in. to 3in. broad, tri- or quadripinnatifid (three or four times divided nearly to the midrib), are borne on tufted, glossy stalks 3in. to 6in. long and of a dark chestnut-brown colour. The lower leaflets, somewhat triangular and disposed 1in. to 1½in. apart, are divided into spear-shaped pinnules (leafits) and oblong, blunt, entire or slightly-lobed segments, of a soft, papery texture, finely hairy, and glandular on their under-side. The abundant brown sori (spore masses) are disposed on the margins of the lobes.—*Hooker*, *Species Filicum*, v., p. 116.

N. (Cincinalis) Hookeri—Cin-cin-a′-lis ; Hook′-er-i (Hooker's), *Eaton.*

This thoroughly distinct, greenhouse species, native of North America, must not be confounded with *N. Hookeri* of Lowe, which is only a form of *N. nivea.* Referring to the North American species, Eaton ("Ferns of North America," ii., p. 26) says : "It is found growing in wild state in clefts of rocks in cañons and on the mountains from the Rio Grande to Arizona, and perhaps extending into Mexico. It has also been collected between Western Texas and New Mexico by Ch. Wright, sent from New Mexico also by Dr. Bijelow, Schott, and Dr. Seguin, and was found near Camp Bowie, in Arizona, by Professor Rothrock and Mrs. Sumner. It was more recently collected on the journey from San Luis Potosi, in Mexico, to San Antonio, Texas, by Dr. Parry." In general appearance this pretty little plant much resembles the better-known *Gymnogramme triangularis.* Its five-pointed, star-shaped fronds (Fig. 148), about 3in. each way, are produced from a short-creeping rootstock, at the end of which the wiry, reddish-brown, smooth, shining stalks, about 6in. long, are clustered. The frond consists of a middle portion of broadly-triangular form, supported on a short but narrowly-winged stalk, and of two lateral divisions, which are stalkless. The upper surface of the fronds is smooth and of a dull, rather dark shade of green, while the powder with which the under-side is copiously coated greatly varies in colour, sometimes being almost white or pale sulphur-yellow, while on some specimens it is of quite a deep yellow, inclining to orange.—*Eaton, Ferns of North America,* ii., t. 49.

Fig. 148. Frond of Nothochlæna Hookeri (½ nat. size).

N. hypoleuca—hyp-ol-eu′-ca (white beneath), *Kunze.*

This greenhouse species, native of Chili, is probably the most matted of any of the group, although the stalks upon which its fronds are borne,

2in. to 4in. long and dark chestnut-brown, are very nearly naked. The fronds, 4in. to 6in. long and about 1in. broad, are bipinnatifid (twice divided nearly to the midrib), with egg-shaped leaflets cut down nearly or quite to the rachis (stalk) below into blunt lobes of a somewhat leathery texture. The upper surface, of a pale green colour, is almost naked, while their under-side is densely matted with a white or slightly rusty-brown substance of a woolly nature.—*Hooker*, *Species Filicum*, v., p. 110. *Nicholson*, *Dictionary of Gardening*, ii., p. 455.

N. inæqualis—in-æ-qua′-lis (unequal), *Kunze.*

A greenhouse species, native of Macalisberg, near Natal, and Angola. Its spear-shaped or nearly triangular fronds, 4in. to 6in. long and 2in. to 3in. broad, are produced from a stout rhizome (prostrate stem) covered with long, narrow scales of a bright rusty-brown colour, and borne on erect, naked, black stalks 3in. to 6in. long and of a firm texture. The upper leaflets are spear-shaped, while the lower ones are distinctly deltoid (in form of the Greek delta, Δ)—hence the specific name—and their blunt, spear-shaped pinnules (leafits) are again deeply cleft. The fronds are of a thick texture, and have both surfaces densely coated with a rusty-brown, woolly substance.—*Hooker*, *Species Filicum*, v., p. 118.

N. lævis—læ′-vis (soft), *Moore and Houlston.*

This very handsome, greenhouse species, native of Mexico, is very seldom met with in cultivation now, possibly owing to repeated failures experienced by its being generally grown in too warm a temperature. Its fronds, which are simply pinnate (only once divided to the midrib), with entire leaflets attached to the midrib by a short stalk and slightly undulated at their margins, are from 1ft. to 1½ft. long and about 1¼in. broad ; they are borne on stalks of a woolly nature, round and very brittle, produced from a short-creeping rhizome (prostrate stem), whose extremity is very densely clothed with silvery scales. The upper surface is of a glaucous-green colour, and the whole under-side is densely covered with long, narrow scales, white in the young fronds, but of a light brown colour in the matured ones. The abundant very dark sori (spore masses) protrude through the scale covering on the margins of the leaflets only.—*Lowe*, *Ferns British and Exotic*, i., t. 14A.

Though considered somewhat difficult to manage, *N. lævis* is one of those plants which amply repay any extra care bestowed upon them; whoever has had the good fortune of seeing it grown, as it was a few years ago, in the select collection of the late Mr. S. Rucker, where, under Mr. Pilcher's care, it formed a most handsome basket, the admiration of every visitor, will testify to the possibility of success. It only requires cool, or at the most intermediate, temperature and a dry position, such as a hanging basket; and when grown in this way the beautiful silvery under-side of its fronds is shown off to greatest advantage.

N. lanuginosa—la-nu-gin-o′-sa (woolly), *Desvaux.*

A pretty and delicate, greenhouse species, easily distinguished from all others by the dense, white, woolly substance which covers its fronds. It is one of the few species native of the South of Europe, being found from Spain to Syria, in Greece, Madeira, Teneriffe, the Cape de Verde Islands, and Algiers, also in Temperate and Tropical Australia. The oblong-spear-shaped fronds, 6in. to 9in. long, 1in. to 1½in. broad, borne on densely-tufted, very short stalks of a woolly nature, are bipinnate (twice divided to the midrib), being furnished with closely-set, spear-shaped leaflets of a soft texture, but thick. The leaflets in the centre of the frond are the largest, and frequently show roundish or oblong, entire or three-lobed pinnules (leafits). The upper surface is of a peculiarly dark green colour, while the under-side is wholly covered with very long, woolly scales, which give the plant quite a distinct appearance, through their spreading some little distance beyond the margin of the leaflets.—*Hooker*, *Species Filicum*, v., p. 119. *Nicholson*, *Dictionary of Gardening*, ii., p. 455. *Lowe*, *Ferns British and Exotic*, i., t. 16A.

This species is well adapted for growing in the crevices of the cool rockery, where it should be planted with very little soil around it, and in an elevated and exposed situation.

N. Marantæ—Mar-an′-tæ (Maranta's), *R. Brown.*

This exceedingly pretty, greenhouse or even hardy species has an extensive range of habitat, being found in the Himalayas up to 15,000ft. elevation, also in Syria and Tauria, in the South of Europe, in the Azores,

Madeira, the Canary Islands, &c. According to Lowe, this interesting plant must have caused a good deal of trouble to the botanists as regards its proper position, for he states ("Ferns British and Exotic," i., p. 52) that "Sprengel, Willdenow, Schkuhr, Linnæus, &c., considered it to be an Acrostichum, whilst De Candolle places it in the same family with our lovely *Ceterach officinarum*." *N. Marantæ* produces from a rhizome (prostrate stem) of a woody nature, and densely covered with bright rusty-coloured, narrow scales, some broadly spear-shaped fronds, 4in. to 12in. long, 1½in. to 3in. broad, and borne on strong, wiry stalks 3in. to 6in. long; they are bipinnate, being furnished with spear-shaped leaflets cut down to the rachis (stalk) into close, oblong, entire pinnules (leafits), of a thick, leathery texture. The upper surface, of a pale green colour, is naked, while the under-side is thickly covered with reddish-brown scales. The sori (spore masses) are disposed all along the margins of the leaflets.—*Hooker*, *Species Filicum*, v., p. 120. *Nicholson*, *Dictionary of Gardening*, ii., p. 456. *Lowe*, *Ferns British and Exotic*, i., t. 18A.

N. Marantæ is seldom met with in anything like good condition, on account of its being usually grown in too much heat. It is a plant which not only prefers, but really requires, thoroughly cold treatment. The most convincing proof of this may be derived from the way in which it is grown, with signal success, by Messrs. J. Backhouse and Son, of York. Nowhere else, perhaps, is it brought to such perfection, and yet very little trouble is taken with it; all through the summer it is grown out in the open, and during the winter the plants are simply put into cold frames, where the frost often penetrates, and where they are protected only from excessive wet weather, which to this species is much more injurious than cold.

N. mollis—mol′-lis (soft), *Kunze*.

This greenhouse species, of medium dimensions, native of Chili and the Andes of Guatemala, is a well-marked, rigid, and robust plant, producing from a very thick, woolly rhizome (prostrate stem) fronds 8in. to 12in. long and 1½in. to 2in. broad, borne on strong, erect stalks 2in. to 3in. long. These fronds are tripinnate (three times divided to the midrib), with their upper leaflets close, the lower ones being distant, spear-shaped, and often upcurled. The leaflets are again divided into small, roundish

segments, of a thick, rigid texture. The upper surface is dark green and smooth, whereas the under-side is densely clothed with a thick, short, woolly, rusty-brown substance.—*Hooker*, *Species Filicum*, v., p. 120. *Nicholson*, *Dictionary of Gardening*, ii., p. 456.

N. Newberryi—New-ber′-rў-i (Newberry's), *Eaton.*

A very pretty, greenhouse species, native of the southern counties of California, where it is frequently found growing among dry and exposed rocks. It was first discovered in 1857, by Professor J. S. Newberry, near San Diego, and has since been gathered near that city by Professor Wood, Mr. Cleveland, and others. *N. Newberryi* is said to be abundant in the Temescal Range, and near San Bernardino. It is easily distinguished from all other North American species by the division and the colour of its broadly spear-shaped fronds, 3in. to 5in. long, borne on nearly black stalks of the same length, and produced from a thick, creeping, more or less branched rootstock, covered with very narrow, dark brown scales. These fronds are tripinnate (three times divided to the midrib), and a few of the pinnules (leafits) near the midribs being again divided, are thus almost quadripinnate. They are of a soft texture and of a peculiar colour, which on both surfaces is produced by a web of very fine hairs. This covering is very dense on the under-surface, but so thin on the upper one that the green colour of the frond may be seen through it; it is very variable in colour, deepening as it does with the age, or state of maturation, of the fronds, which when young are creamy white, and when fully developed are of a pale rusty-brown tint. In the fertile fronds the spore masses form a blackish line around the edge of the minute, roundish segments, which are perfectly flat, and they have not even the suggestion of an involucre (covering).—*Hooker*, *Synopsis Filicum*, p. 515. *Nicholson*, *Dictionary of Gardening*, ii., p. 456. *Eaton*, *Ferns of North America*, i., t. 39.

N. (Cincinalis) nivea—Cin-cin-a′-lis; niv′-ĕ-a (snowy), *Desvaux.*

This lovely, stove species, of small dimensions, deservedly one of the most popular in cultivation, is a native of the Andes, from Mexico to Peru. In general aspect it is a counterpart of the better-known *N. flavens* (*N. chrysophylla*), which species it resembles in most particulars, though not

quite so robust, and of a slenderer and more drooping habit. The most distinctive character of this extremely interesting plant, however, is the dense, pure silvery-white powder covering the under-side of its flexible fronds, and through which the abundant and naked sori (spore masses) protrude ; these sori are disposed all round the margins of the small, roundish pinnules (leafits). This character fully accounts for the common name of "Silver Maidenhair Fern" ; the blackness of the stalks adds to the delusion, as their slender and shining nature is very similar to that of most Adiantums. The stalks are 4in. to 6in. long, and are covered at their base with narrow scales of a bright rusty-brown colour. The fronds themselves are tripinnate (three

Fig. 149. Frond of Nothochlæna nivea Hookeri
(½ nat. size).

times divided to the midrib), with distant leaflets, long-stalked pinnules (leafits), and blunt, roundish segments of a somewhat leathery texture and pale green colour.—*Hooker*, *Species Filicum*, v., p. 111. *Nicholson*, *Dictionary of Gardening*, ii., p. 456. *Lowe*, *Ferns British and Exotic*, i., t. 13.

N. nivea is a most useful plant where baskets of small dimensions are required for the warm house ; it should be kept very near the light, and in a position where no syringing is likely to reach it.

N. n. Hookeri—Hook′-er-i (Hooker's), *Lowe*.

A garden variety, differing from the above species through its close and enlarged segments and stalkless leafits (Fig. 149).—*Hooker*, *Synopsis Filicum*, p. 374.

N. Parryi—Par′-rў-i (Parry's), *Eaton.*

This very pretty, greenhouse plant, of small dimensions, is one of the most distinct of all the North American species, and belongs to the group of woolly kinds which comprises *N. lanuginosa*, *N. Marantæ*, and *N. Newberryi*. It is found in a natural state near St. George, Utah, growing in dense tufts, in very dry and exposed places among the crevices of rocks, where it has often to endure long-continued drought and a great amount of heat. It has also been frequently met with in Arizona, in the Valley of Colorado, Marengo Pass, San Bernardino County, California, San Diego, &c. The fronds, which are produced from a short rootstock, thickly covered with chaffy, blackish scales, are borne on slender, dark brown or blackish stalks 4in. to 5in. long and provided with whitish hairs. The leafy portion, about 5in. long and oblong-spear-shaped, is greenish-white above and rusty-white beneath, a colour due to the slender, pointed hairs which completely cover both surfaces, but the lower one more thickly than the upper. Another peculiarity of this little gem is that the pinnæ (leaflets) are again pinnate, the pinnules (leafits) being set very close together and scarcely visible through the woolly covering; when denuded of this they are found to be very small, either roundish or egg-shaped, and notched, the upper ones being less distinct, and the uppermost even confluent with the terminal segment. Although the outer margin is slightly recurved, it is never sufficiently so to cover the very dark-coloured spore masses which are disposed three or four together, forming a ring of about twenty joints. There is also another noticeable feature, and that is, that when the leaflets have fallen from the rachis or the fronds from the stalks, these remain on the rootstock for a year or more before they fall off or decay.—*Eaton*, *Ferns of North America*, ii., t. 74.

N. Pohliana—Pohl-ĭ-a′-na (Pohl's), *Kunze.*

A stove species, of small dimensions, native of Brazil. Its spear-shaped fronds, 3in. to 4in. long, 1½in. broad, and bipinnate (twice divided to the midrib), are borne on tufted, slender stalks 3in. to 4in. long, naked, black, and of a wiry nature. The leaflets, disposed in numerous pairs and spear-shaped, are provided with several stalkless, oblong, notched pinnules (leafits) of a somewhat leathery texture, and having both surfaces, more especially

the lower one, covered with long, silky hairs. The bright brown sori (spore masses) are disposed on the margins.—*Hooker*, *Species Filicum*, v., p. 118, t. 286B.

N. Rawsoni—Raw′-son-i (Rawson's), *Pappe.*

This greenhouse species, native of Namaqualand, where it was first discovered by the Rev. Mr. Whitehead, is very distinct. Its fronds are produced from a wide-creeping rhizome (prostrate stem) of a woody nature, covered with linear (narrow) scales black in the centre and of a rusty-brown colour towards the edge, and are borne on upright, naked, dark chestnut-brown stalks 3in. to 4in. long, of a wiry nature; they are 6in. to 9in. long, ½in. broad, and simply pinnate. The leaflets, disposed in distant pairs, are nearly as broad as long, and deeply cleft; they are of a somewhat leathery texture, pale green on their upper surface, which is naked, while their underside is densely matted with a bright rusty-brown, woolly substance. The black and abundant sori (spore masses) are disposed along the edge, which is not inflexed.—*Hooker*, *Species Filicum*, v., p. 110.

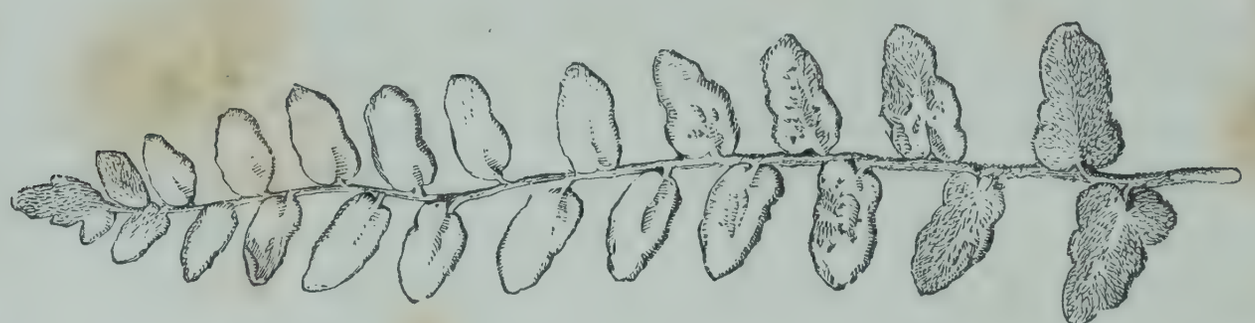


Fig. 150. Frond of Nothochlæna sinuata
(⅓ nat. size).

N. sinuata—sin-u-a′-ta (wavy), *Kaulfuss.*

A beautiful Fern, found growing naturally on rocks much exposed to the sun, in Peru, Chili, and Mexico, where it is said to thrive on limestone, trachyte, and conglomerate, in crevices of lava, and on walls, and is reported as luxuriating in a vertical range from 2000ft. to 7000ft. above the sea, these elevations subjecting it to widely-varying temperatures. *N. sinuata* is also a native of Texas and New Mexico, and is sometimes grown in a cool house; it makes, however, a much handsomer plant when cultivated in heat than when kept in a cool house. Its real place is the stove, or, at least, the

intermediate house, and, on account of the length of its gracefully-pendulous fronds, it should be grown, if possible, in a hanging basket—really the only way to show off to advantage its lovely fronds, which are 1½ft. to 2ft. long, 1in. to 3in. broad, and borne on firm yet flexible stalks 2in. to 4in. long and of a chestnut-brown colour. These fronds are simply pinnate, being provided with short-stalked, egg-shaped or oblong pinnæ (leaflets), disposed alternately along the stalk (Fig. 150), and varying from entire and undulated to deeply cleft. The texture is thick and leathery, the upper surface is pale green and slightly hairy, while the under-side is densely coated with small, narrow, rusty-brown scales. The black and abundant sori (spore masses) are disposed along the edges of the leaflets, which are slightly inflexed.—*Hooker*, *Species Filicum*, v., p. 108. *Nicholson*, *Dictionary of Gardening*, ii., p. 456. *Botanical Magazine*, t. 4699. *Eaton*, *Ferns of North America*, i., t. 39.

N. squamosa—squa-mo′-sa (scaly), *Fée.*

This stove species, which is also known as *N. Gillesii*, is said to have been introduced into England about 1842; it is a native of Mexico and Peru, and is also reported as coming from Cerro del Morro, San Luis, Argentine Republic. The broadly spear-shaped fronds, 3in. to 4in. long, 1in. or more in breadth, and borne on tufted stalks 1in. to 4in. long, are bipinnate (twice divided to the midrib). The egg-shaped, blunt leaflets are usually opposite or disposed in pairs; they are cut down to the rachis (stalk of the leafy portion) into several narrow-oblong pinnules (leafits), of a somewhat leathery texture, and have their upper surface of a pale colour and smooth, while their under-side is densely covered with fringed scales of a light brown colour. The light brownish sori (spore masses) are disposed along the margin of the leaflets. — *Hooker and Greville*, *Icones Filicum*, t. 151. *Nicholson*, *Dictionary of Gardening*, ii., p. 456. *Lowe*, *Ferns British and Exotic*, i., t. 17B.

N. (Cincinalis) sulphurea—Cin-cin-a′-lis; sul-phur′-ĕ-a (coloured like sulphur), *J. Smith.*

This greenhouse species, native of California and Mexico, is very distinct on account of the shape of its fronds, which are deltoid (in form of the Greek delta, Δ) and 2in. to 3in. each way; they are produced from a creeping

rhizome (prostrate stem) densely covered with rigid, narrow, nearly black scales, and borne on tufted, black, wiry stalks 4in. to 6in. long. The upper leaflet is simple; the central ones are spear-shaped, and cut down to the rachis (stalk) at the base into oblong lobes; and the lowest pair have their lowest pinnules (leafits) much prolonged and deeply cleft. The fronds are of a somewhat leathery texture; their upper surface is naked and pale green, while their under-side is coated with either white or yellow powder, with which the black sori (spore masses) form a very pretty contrast.—*Hooker*, *Species Filicum*, v., p. 111. *Nicholson*, *Dictionary of Gardening*, ii., p. 456.

N. (Cincinalis) tenera—Cin-cin-a′-lis; ten′-er-a (tender), *Gilles.*

A very pretty, greenhouse species, found growing naturally in Chili, Bolivia, and Peru, also in Southern Utah. Its predilection for crevices of perpendicular rocks at a high altitude accounts for the difficulties generally encountered in its culture when, as is nearly always the case, it is subjected to warm treatment. A greenhouse temperature is all that is required in order to grow it successfully. From a central crown, chaffy with narrow scales of a bright rusty-brown colour, are produced the egg-shaped fronds, 3in. to 6in. long and 1½in. to 2in. broad; these in full-grown plants are tripinnate (three times divided to the midrib), with numerous rather distant, mostly opposite leaflets, and somewhat heart-shaped leafits, usually long-stalked, and of a pale glaucous (bluish-green) colour on both surfaces. The leafits are entirely covered with spore masses of a peculiar dark brown colour.—*Hooker*, *Species Filicum*, v., p. 112. *Botanical Magazine*, t. 3055. *Eaton*, *Ferns of North America*, i., t. 43. *Lowe*, *Ferns British and Exotic*, i., t. 39.

N. (Cincinalis) trichomanoides—Cin-cin-a′-lis; trich-om-an-ŏ-i′-dēs (Trichomanes-like), *R. Brown.*

Undoubtedly this is one of the handsomest among the rare species met with in collections, and one which, when well grown, never fails to attract attention. The particularly decorative and drooping habit of its narrow fronds, 6in. to 12in. long and rarely more than 1½in. broad, the peculiar white colour of their under-surface, due to a combination of white, stellate (star-like) scales and fine farinose powder intermixed, render this

plant one of the most striking of the whole genus. It is a native of Jamaica and Cuba. The fronds, produced from a central crown and borne on tufted, firm stalks 2in. to 4in. long, of a chestnut-brown colour, and slightly scaly, are simply pinnate (only once divided to the midrib). The oblong, blunt leaflets show some conspicuous, blunt lobes (Fig. 151), all of a somewhat leathery texture, white underneath, and belted all round the margin with an

Fig. 151. Frond of Nothochlæna trichomanoides
(⅓ nat. size).

even and uninterrupted band of very conspicuous and ornamental, black spore masses.—*Hooker*, *Species Filicum*, v., p. 109. *Nicholson*, *Dictionary of Gardening*, ii., p. 456. *Lowe*, *Ferns British and Exotic*, i., t. 14B.

As a Fern for a medium-sized hanging basket, *N. trichomanoides* has few equals, as its abundant fronds are most elegantly pendulous. It requires to be grown in a light compost of either fibrous peat or leaf-mould and silver sand. We find that the intermediate house is the place where it thrives best, and where its fronds last the longest on the plant, provided they are kept perfectly dry at all seasons.

END OF VOLUME II.

ACC NO... 5787

ಗ್ರಂಥಾಲಯ
ಲಾಲ್‌ಭಾಗ್, ಬೆಂಗಳೂರು

ಡಾ॥ ಎಂ.ಹೆಚ್.ಮರೀಗೌಡ ರಾಷ್ಟ್ರೀಯ ಗ್ರಂಥಾಲಯ

ಲಾಲ್‌ಬಾಗ್, ಬೆಂಗಳೂರು – 560 004

ಪ.ಸಂಖ್ಯೆ:... ವ.ಸಂಖ್ಯೆ:.....

ಗ್ರಂಥ ಹಿಂದಿರುಗಿಸುವ ದಿನಾಂಕ ಚೀಟಿ

ಈ ಕೆಳಗೆ ಕಾಣಿಸಿರುವ ದಿನದಂದು ಅಥವಾ ಅದಕ್ಕೂ ಮುಂಚೆ ಈ ಪುಸ್ತಕವನ್ನು ಹಿಂದಿರುಗಿಸಬೇಕು. ಅಥವಾ ಮುಂಚಿತವಾಗಿ ನವೀಕರಿಸಬೇಕು. ಇಲ್ಲದಿದ್ದರೆ ಒಂದು ದಿನಕ್ಕೆ ರೂ.1.00 ದಂಡ ಕೊಡಬೇಕಾಗುತ್ತದೆ.

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ಪು.ತಿ.ನೋ..

ತೋಟಗಾರಿಕೆ ಇಲಾಖೆಯ
ಗ್ರಂಥಾಲಯ

ಲಾಲ್‌ಬಾಗ್, ಬೆಂಗಳೂರು-560 004